# The understanding of the urban pattern of the financial district with the introduction of new technological improvements in the process of conducting business

by

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Submitted to the Department of Architecture in partial fulfillment of the requirements for the degree of
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Submitted to the Department of Architecture on May 25,2006
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**ABSTRACT**

The thesis poses a question for the future of financial districts.
Attempting to understand the future evolution of financial districts. It begins by tracing the history of financial speculation and its expressions in architecture and the city.

Analysing the New York Stock Exchange and the changes associated with it in the past 150 years. And how the financial institution has transformed with the introduction of the Electronic Communication Network. The new dispersed identity of the finance, with new diversifications in trading and the slow death of the trading floor.New positions of centrality in the system of finance. Where the Network has created an increased centrality of the system, and the possibility of dispersion also. Working with this duality of the network and analogies which can be built from the geography of the network, as posed by physicists in their current research. Parallels drawn between the nature of the creation of these networks, due to the formation of a new market structure and its new positions, in centralized global cities, edge cities and in the possibilities of locating back offices in other countries.

Therefore the new nature of business allows a new understanding of how urbanism must respond to work with the new market structure and create a new interpretation of how the network can be accomodated and understood for future financial districts.

Thesis Supervisor: Alexander D'Hooghe
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And I would also like to thank Mr Narender Patni who made this visit to the New York Stock exchange possible. I would also like to thank Anant Bhalla (my cousin brother) for his unending conversations with me on financial markets and understanding the current trends in the financial world. And Karna, for putting me in touch with traders and market specialists to conduct inetrviews with.

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**CONTENTS**

## INTRODUCTION

The thesis starts by analysing how financial speculation evolved. Chapter one provides an understanding of what the nature of transactions were and how the nature of finance changed with innovations in mathematics, science and new discoveries.

Yet the basic idea with which finance functions is mathematics, and the changes in the ideas of mathematical principle were needed to analyse the changing complexity.

The next chapter introduces the New York Stock Exchange as an instrument of finance. And traces how it changed in shape and form with time. A number of documents and pictorial represetations create a visual trajectory through the different stages of development in the history of the New York Stock Exchange. Tracking the changes which began to be associated with the position of the building in Wall street and it process of introducing new effecient systems, with time. And simultaneously the changes in the form of the Lower Manhattan region, with the expansion and eventually the shift of financial services to Mid Town Manhattan, and the reasons why this shift took place.

Chapter three builds on understanding the nature of market structures after the introduction of the Electronic Communication network and how these introductions have changed business patterns.

Understanding the network as a form and how it would have an implication in the distribution system and fragmentation of market structures. Providing a deeper analysis of market structures through business patterns and how they have changed character in the past few years, after thr internet.

This analysis of market structure works with the network. This chapter involves itself with the workings of the market and finally leads to understanding how world cities are world cities. How the centrality in the position of finance are now working with a new meta-pattern in the centrality of financial services, which are located in a few hubs, which are the major players of the game.
The next chapter deals with the market structure and how certain instruments of finance, like the bank have changed their modes of operation in the past decade, with the introduction of automated systems.

This chapter provides insight on how automated systems which are now the future are re-structuring the way business is dispersed using the network to its advantge in the creation of a new dispersed identity of previous static models.

The creation of this fluidity needs a response in the way urbanism must work to accomodate these projections for the future of financial districts.

The last chapter, provides some possible ideas, conclusions based on the problems of the current static situations.

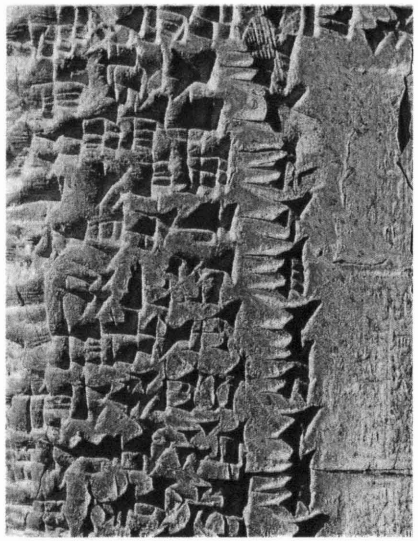


figure 1: Babylonian Tablet in cuneiform script.One of the first recordings of financial loans

## 1.1 The History of financial speculation

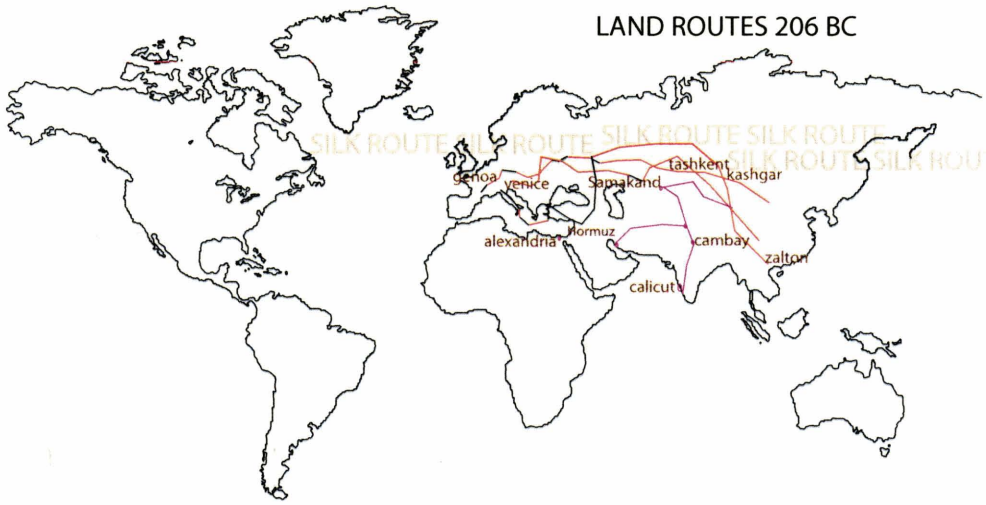
The earliest forms of data in financial transactions existed in Babylon during the third millennium. These forms of transactions were recorded in cuneiform script (wedge writing), and took the form of loans. Due to the creation of two characteristically different groups of society (the urban and the rural populations), their needed to be a form of exchange. As a result, money was conceived as this form of exchange which would be lent without interest. A credit system evolved with the concept of interest, which was introduced for the first time.

*The organized exchange of agricultural and manufactured products and services was at first centered in the temple, and religious structures are the earliest monumental buildings in Babylonian cities. In addition to an organizational staff and a physical place for storage, the temple provided an ideological basis for the exchange of goods: the city god housed in the temple received the varied contributions from the institutional community and distributed goods in return. Over the first half of the third millennium the palace usurped the centrality of the temple in this redistributive system.*[1]

The Temple formed the first place where financial transactions were conducted.And this form of exchange was usually not associated with making profit. Loans were remunerated in the form of services. It is interesting to note the duality of the Temple in servicing the needs of spirituality and materiality. And the idea of associating two different operations of power (money and god) in the presence of one space.

Following these principle the monastery was used as a space where pawnshops were located within the monastery in order to give

[1] Goetzmann, William N and Rouwenhorst, Geert K. The Origins of Value:The Financial innovations that created Modern Capital markets. New York: Oxford University Press. 2005.



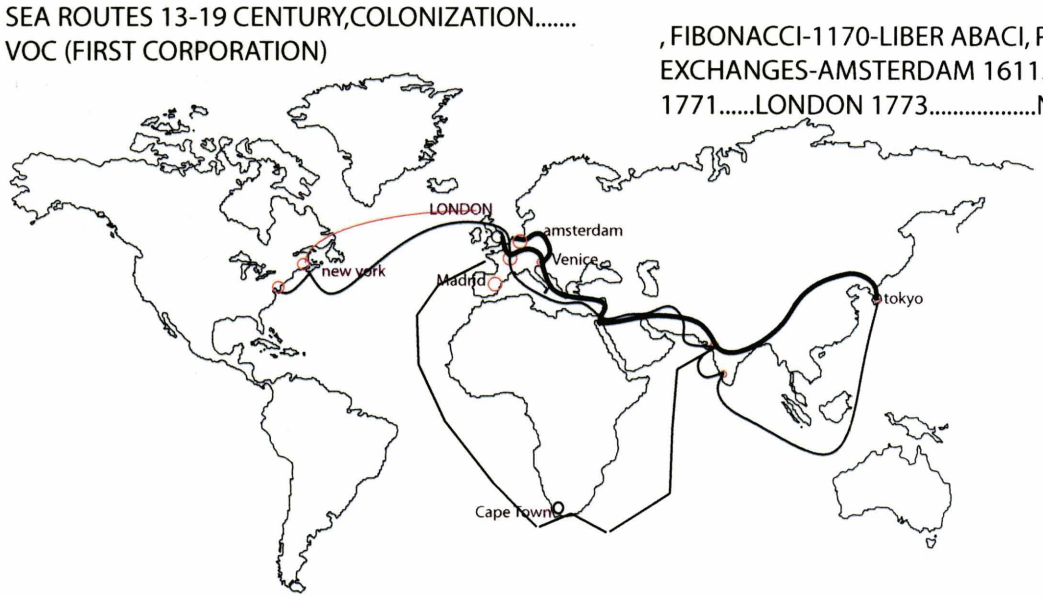




figure 2: Maps showing the silk route and the mercantile trading routes established

credit. The concept of these pawnshops was to provide loans which were free of interest. And the trust which developed was of the highest order, as there was a fear of god associated with the re-payment of the loan. Similar parallels have been found in Italy, where the pawnshops were meant to be predecessors of the modern bank. They were called "monte de pieta"(mount of piety), in which the Franciscans provided these loans from pawnshops.

*Initially founded in 1496 as a charitable institution for providing the poor with small loans against pawns, the Monte de Pieta later became a deposit bank and a powerful financial device for the dukes willing to draw capital both for themselves and their friends.*[2]

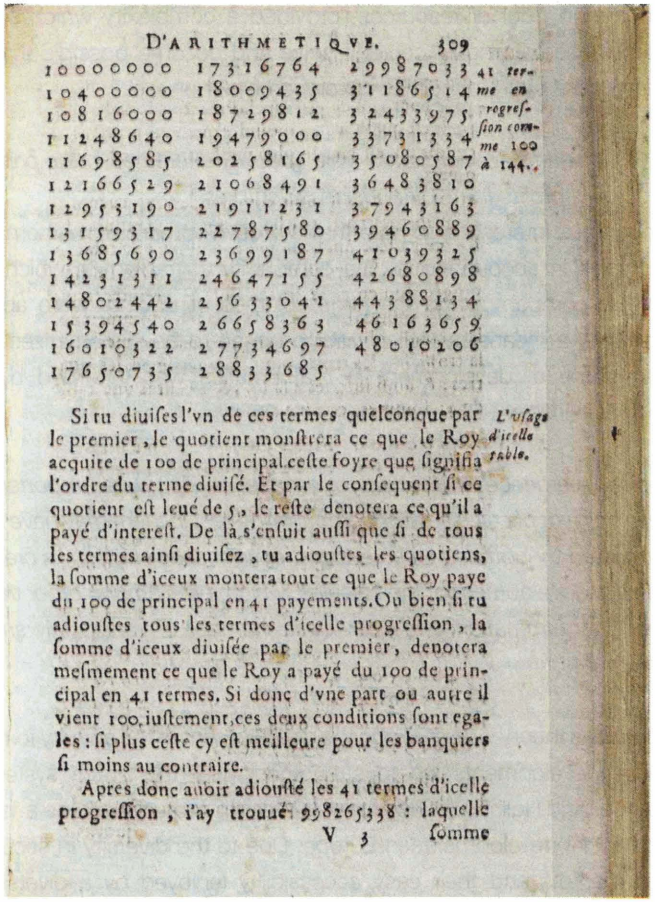
The next reference to financial transactions were found in ancient Rome. These trading exchanges were also located next to the Temple. Specifically in the Forum Romanum, trading was conducted next to the Temple of Castor. Shares were traded as "partes", which seemed to follow similar principles as the modern share market.

While the conception of the history of the corporation in the seventeenth century can be identified as the East and West Indian companies. The world's first business corporations were formulated 2000 years before that. The Roman *societas publicanorum or "society of publicans"* anticipated the modern corporation. The next important point to note in the development of financial history, is conceiving the syntax of this operation. The modality of calculation was based on the rules developed in mathematics. And one of the crucial developments at this point in time was the contribution of Leonardo of Pisa (also called Fibonacci), in his book "Liber Abaci".

*Leonardo was arguably the first scholar in world history to develop a detailed and flexible mathematical approach to financial calculation. He wrote his book Liber Abaci in the year 1202 in the City of Pisa. It is best known for the Fibonacci series, a sequence of numbers describing geometric population growth. What is less well known is that the famous series is only a single example in a book devoted almost entirely to the mathematics of trade, valuation, and commercial arbitrage. Liber Abeci develops practical mathematical tools for calculating present value, compounding interest, evaluating geometric series, dividing profits from business ventures and pricing goods and monies involving a complex variety of weights, measures and currencies.*

*As an example the table of contents best describes it:*

1. *Here begins the first chapter*
2. *On the multiplication of whole numbers*



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| 121665290 | 210684 91 | 364838 10 | |
| 126531902 | 219112 31 | 379431 63 | |
| 131593178 | 227875 80 | 394608 89 | |
| 136856905 | 236994 87 | 410393 25 | |
| 142331311 | 246471 55 | 426808 98 | |
| 148024423 | 256330 41 | 443881 34 | |
| 153945400 | 266583 63 | 461636 59 | |
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Si tu diuiſes l'vn de ces termes quelconque par le premier, le quotient monſtrera ce que le Roy acquite de 100 de principal ceſte foyre que ſignifia l'ordre du terme diuiſé. Et par le conſequent ſi ce quotient eſt leué de 5, le reſte denotera ce qu'il a payé d'intereſt. De là s'enſuit auſſi que ſi de tous les termes ainſi diuiſez, tu adiouſtes les quotiens, la ſomme d'iceux montera tout ce que le Roy paye du 100 de principal en 41 payements. Ou bien ſi tu adiouſtes tous les termes d'icelle progreſſion, la ſomme d'iceux diuiſée par le premier, denotera meſmement ce que le Roy a payé du 100 de principal en 41 termes. Si donc d'vne part ou autre il vient 100 iuſtement, ces deux conditions ſont egales: ſi plus ceſte cy eſt meilleure pour les banquiers ſi moins au contraire. *L'vſage d'icelle table.*

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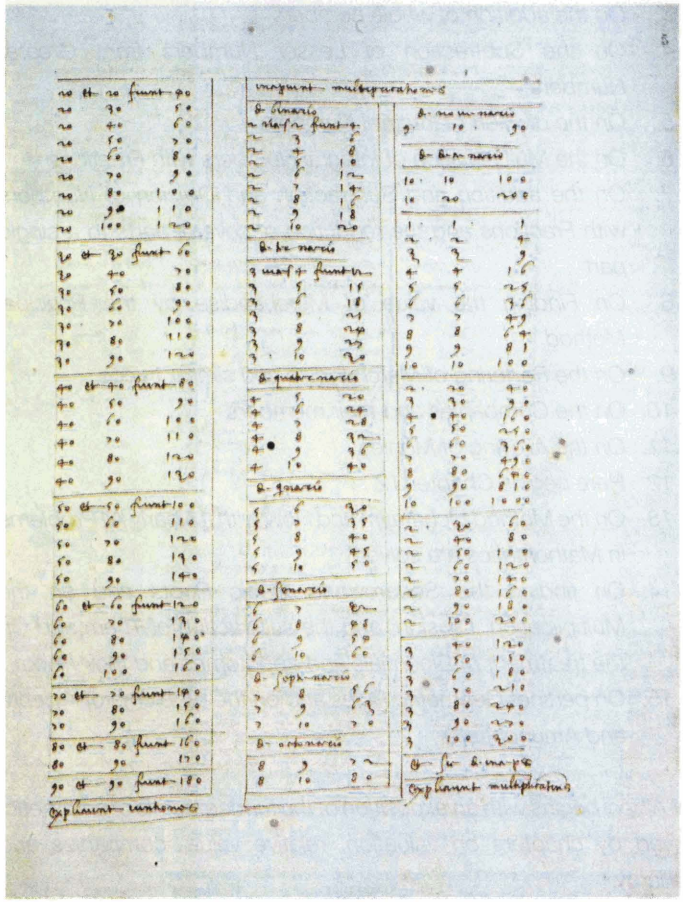


Figure 3: The Liber Abaci. Based on the principles of Fibonnacci's conclusions.

3. *On the addition of whole numbers*
4. *On the Subtraction of Lesser Numbers from Greater Numbers*
5. *On the division of Integral Numbers*
6. *On the Multiplication of Integral Numbers with Fractions*
7. *On the addition and Subtraction and Division of Numbers with Fractions and the reduction of several parts to a single part*
8. *On Finding the value of Merchandise by the Principal Method*
9. *On the Bartering of Merchandise and similar things*
10. *On the Companies and their members*
11. *On the Alloying of Monies*
12. *Here begins Chapter 12*
13. *On the Method Elchataym and How with It Nearly All Problems in Mathematics are solved*
14. *On finding the Square and Cubic Roots and on the Multiplication, Division, and the subtraction of Them and On the treatment of Binomials and appotomes and their Roots.*
15. *On pertinet Geometric Rules and on the problems of Algebra and Amunchablia*

*Liner Albeci begins with an exposition of the fundamentals of arithmetic, followed by chapters on valuation, relative value, companies and metallurgy.*[3]

Essentially the Liber Abaci, dealt with a distribution of profits from joint business ventures. This idea of joint business ventures involving a common pool of resources, provided a complexity which simple mathematical formulae couldn't solve and became possible through the process of the principles developed by Fibonnaci.

*At this point Italian merchants were specially interested in the principle of dividing profits from joint business ventures.*[4]
It becomes interesting to note that the development of mathematical principles in accounting for the complexity of trading (in which joint venture company's and the large volumes of trading) were able to formulate a means by which trading began to be systematized. The next stage of development in mathematics was informed by the interest in infinity.

*The convergence properties of infinite series were important in development of calculus and Bernoulli's interest in them may have been stimulated by Gottfried Leibniz, together with Isaac Newton, is credited with the development of the calculus, which relies among other things, upon the summation of a near-infinite number of vanishingly smaller increments.* [5]

Bernoulli's theory was crucial in the development of the annuity formula. These developments led to strengthening of the Dutch system of finance. And Holland, during the seventeenth century became a leader in financial developments in Europe. Due to the diversity in securities and markets and their easy accessibility (enjoyed by a diversity of people). It was possible for a level of diversification in Portfolio's and to structure a portfolio which was balanced in stock and bond.
Therefore, it becomes an interesting point to note that a cohesive spirit



[2] Goetzmann, William N and Rouwenhorst, Geert K.
[3] Goetzmann, William N and Rouwenhorst, Geert K. The Origins of Value:The Financial innovations that created Modern Capital markets. New York: Oxford University Press. 2005.

Figure 4 :The Amsterdamexchange

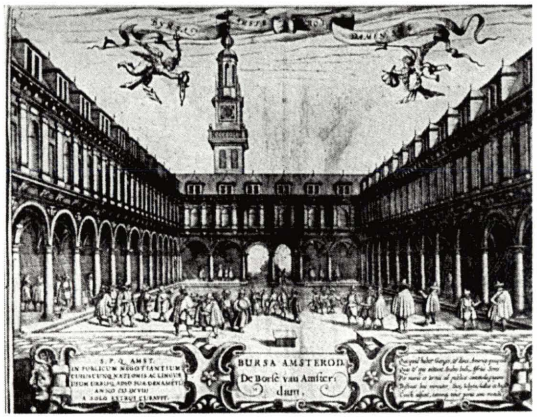



Figure 5 :The Amsterdam exchange (a view from inside)

in mathematical principles and the complexities of the trading market worked together to create emerging centers of finance in Amsterdam, Venice, Antwerp and London.
*Amsterdam opened a stock exchange in 1611, Europe's oldest. The Austrian Bourse opened in Vienna in 1771, largely to trade government bonds to finance the war. By the end of the 19th century it had 2500 equities listed and was one of Europe's most important financial centers. In London, brokers and jobbers (as they were called) met in coffeehouses. To regulate the market, New Jonathan's Coffee House was converted into the "Stock Exchange" in 1773.*[6]

The Amsterdam exchange was modeled on the London Royal exchange containing a central courtyard, enclosed by a shaded colonnade which provided shelter to the traders. The exchange also comprised of some shops at the entrance dealing with stationery and printed forms and contracts.

*The first description of the Stock Market activity in Western Europe is provided by Joseph Penso De La Vega in his Confusion de Confusiones, written in Spanish and published in Amsterdam in 1688. In a series of dialogues between a merchant and a shareholder he describes the stock market as a madhouse, full of strange superstitions, peculiar practices and compulsive attractions. Confusion provided a definitive picture of the speculative psychology.*[7]

The momentum of confusion, created a complexity in the level of comprehending this system of operation, which seemed to follow a coded language. Its inherent property to be distinguished through a confusion, can seem to be so because it was in its very nascent stages of conception. The whole ritual associated with this "act of exchanging" was seen as "an affair for fools".

*A member of the Exchange opens his hand and another takes it, and thus sells a number*

[4]

[5] Goetzmann, William N and Rouwenhorst, Geert K. The Origins of Value:The Financial innovations that created Modern Capital markets. New York: Oxford University Press. 2005.
[6] Valdez, Stephen. An introduction to Global Financial Markets. London: Palgrave Macmillan 2003.
[7] Chancellor, Edward. Devil take the hindmost: A history of financial speculation. New York: Plume.2000.

*of shares at a fixed price, which is confirmed by a second handshake. With a new handshake a further item is offered, and then follows a bid. The hand reddens from the blows (I believe from the shame that even the most respected people do business in such a manner as with blows). The handshake are followed by shouting, the shouting by insults, the insults by impudence and more insults, shouting, pushes, and handshakes till business is finished. Comparing Vega's description of speculators in Confusion with a recent description of traders at the NYSE. Gathered in a close ring the traders shake their fists in each others faces, faces torqued tight, twist.. Shouting gets more intense, roaring and echoing despite the sound absorbing tiles, as the decibels crash in waves and the ears ache from the noise. Fingers flail; arms thrust, the ring knots, bunches turns.....A tall spectator waves two fingers, three, shakes his head, nods, waggles his hand just above his hair.*[8]

In the Amsterdam Bourse there was perpetual conflict between the Bulls and the Bears. The Term Bear refers to the English term describing "a speculator for a fall", originating from the well known proverb "to sell a bears skin before one has caught the bear" (to contract to sell that what you did not as yet own). Defoe in *Anatomy of Exchange Alley* refers to Buyers of Bears skins. The associated Bull derived from the German verb stem bullen, meaning "to roar", appears somewhat later and was perhaps suggested by the bear.

*The spirit of speculation is anarchic, irreverent, and anti-hierarchic. It loves the freedom, detests cant, and abhors restrictions. From the tulip colleges of the seventeenth century to the internet investment*

Figure 6 :The confusions associated with an exchange

*clubs of the late twentieth century. Speculation has established itself as the most demotic of economic activities. Although profoundly secular, speculation is not simply about greed. The essence of speculation remains a Utopian yearning for freedom and equality which counterbalances the drab rationalistic materialism of the modern economic system with its inevitable inequalities of wealth. Throughout its manifestations, the speculative mania has always been and remains to this day, the Carnival of Capitalism, a "Feast of Fools".*[9]

[8] Millman, Georgory. Around the world on a Trillion Dollars a Day. London 1995.
[9] Chancellor, Edward. Devil take the hindmost : A history of financial speculation. New York: PLUME. 2000

The phrase "Carnival of Speculation has been applied to both the New York gold market in the 1860's and the 1920's bull market on Wall Street. This is the idea with which the New York stock exchange was created.

1.2 The Architecture of finance

*Money is concerned only with what is common to all: it asks for the exchange value, it reduces all quality and individuality to the question: How much? All intimate emotional relations between persons are founded in their individuality, whereas in rational relations man is reckoned with like a number, like an element which is in itself indifferent.*[10]

Money in its entirety is able to create a level of comprehension, where it is able to form a valuation process building a patterned system of values. The meaning of space and money, is an extremely abstract principle to discuss in its absolute terms, as the notions of money are attributed to a space when there is code which expresses certain political/technological/social meaning and is explored through the architecture which is specific to its time and place. And this temporality attunes a code with which we can perceive becoming an omnipresent sign which repeats itself.

*The transgressions of Soane's décor indeed relied on convention and precedent. Sketching out the ornament for the Bank Stock Office in late January 1792 Soane had carefully keyed various motifs (not all realized) to specific sources. The wave scroll band above the doorway and fret mouldings around the oculus derived from Taylor's adjacent Bartholomew Lane vestibule, according to Soane's margin notes. Greek-key fret mouldings in the pilaster cap frieze came from the first-century Athenian tower of the winds. Vine mouldings in the arch soffit's and modillions in the lanterns cornice imitated plates from Robert Woods The Ruins of Palmyra (1753). Soane's recognizably Grecian Palette also included the Rotunda's anthemion frieze beneath the drum, Greek keys flanking the doors and lunettes and in the dome. Much of this could be found in the work of James Athenian Stuart, the Adams, Willian Kent, Chambers, and the mid-century French style Grec of Louis Francois Trouard and Pierre –Louis Morreau Desproux.*[11]

*Admittedly Soane violated strict orthodoxy by departing from classical systems of proportions, especially in the Bank Stock Office's attenuated pilaster strips and segmental arches and its piers' stubby proportions. But architects had been arguing for these variations theoretical correctness on the grounds of creativity, variety, character and antique precedent from at least the time of Antoine Desgodetz's Les Edifices de Rome (1682). Soane also broke strict classical rules by reducing the Bank Stock Officers pilaster Ornament to a mere Greek –key frieze, in effect suppressing the entablature.*[12]

[10] Heynen, Hilden. Architecture and Modernity a critique. Cambridge :MIT Press.1999.
[11] Abramson Daniel M. Building the Bank of England Money ,architecture ,society. New Haven: Yale university press.

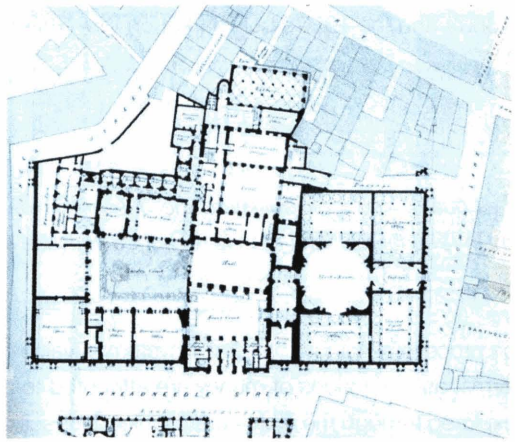


Figure 7 : The Plan of The Bank of England

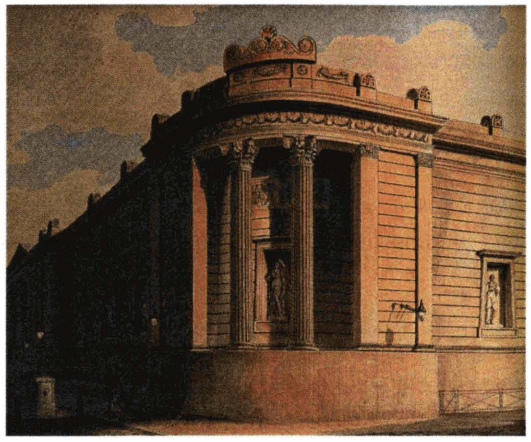
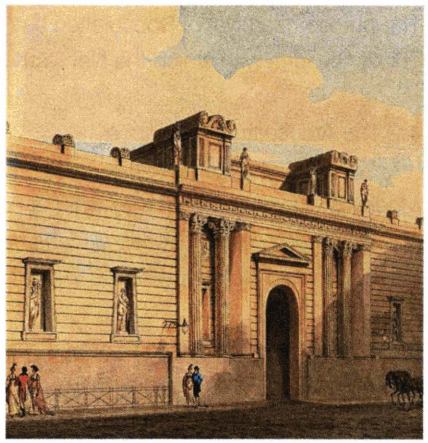


Figure 8 : The Facade of The Bank of England



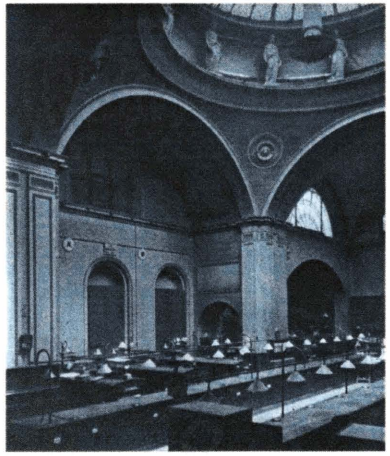


Figure 9 : The Spherical ceilings in the Bank of England

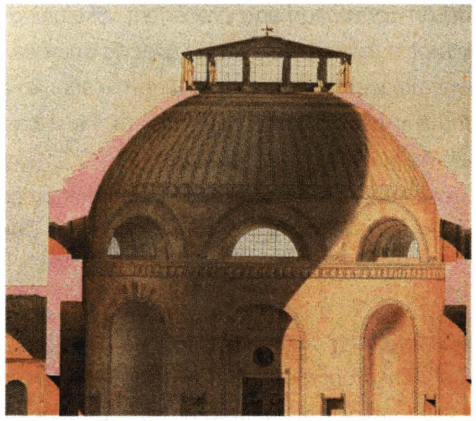


Figure 10 : Inspiration for the Bank of England

*What Soane did accept was Laugier's conservative impulse to revalidate classicism through a process of purification, rationalization and abstraction.*

And the idea of " dematerialized walls and suspended overhang canopies- what Soane called Spherical ceilings", was responsive to creating an abstractness, where the dissolution of the wall, and the creation of a new form of the ceiling. The inspiration for the ceiling of the spherical nature was conceived from the Pantheon

in Rome as can be seen from the illustrations in the following page. The creation of parallels in the form of classical orders in space and their implied inspirations in banks seem to follow a pattern in Bank Architecture.
*Private bankers had no need to move to another quarter. A house with a cellar below, a shop and parlour on the ground floor, and a sign outside, was as suitable for a self styled banker as it had been for a goldsmith. An impressive building was a mark of solidity. The banker had to convince a prospective deposition that his service was better than the alternative of hoarding plate or hoarding coin. Few people would have entrusted money to a banker in a terrace cottage. As important as the place of business was the evidence of personal prosperity.* [13]

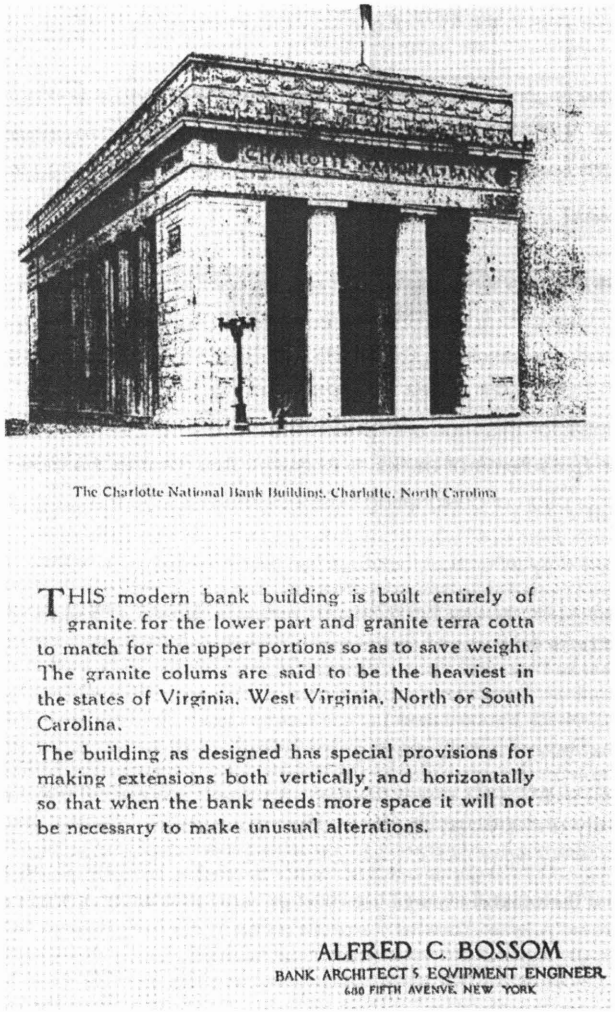
During this period the stylistic rendering to "bank architecture" seem to evolve by coding specific signs which begin to hold associations with ideas of stability and trust. Or ideas which would create a sense of belonging to a certain type of building. Stylistic forms which echoed a memory of an era or a particular class of people who could identify with this stylistic expression became essential. The mode with which these codes created a reassuring sense within the mind of the investor was essential for the propagation of this building type. The shift from the rural banks to an era of private banking and a sense of identification of this form of architecture was essential for this moment. During the 1700's the Bank Architecture which was prescribed as a formula because the British system prohibited Corporate systems of banks to operate. This created the dualism of dwelling and banking to exist in one quarter. Making the facades distinct. This prescription of designating business premises on the ground floor and residential floors on the upper floors.

*Four Doric Columns framing a rusticated door and window arches at the street level signaled that the structure was a business. The upper levels were relatively restrained in manner; the façade above the first floor was stuccoed brick with windows framed by simple architraves, and a razor thin cornice was topped by a balustrade.*

Though the American Banking system were structured as corporations. And their architecture was based on inspirations from a varied palate of stylizations.The emphasis was to constantly innovate these expressions, and induce them with Greek revivalist, Victorian embellishment, Gothic suggestions and such stylized interpretations which were able to create complexity and stylized abode for the new bankers. Yet the styles in themselves did not create a distinguishing signification, in their own interpretation of creating a truly unique generative architectural style. What evolved through the passage of time was extremely arbitrary depending upon the architectural style of the moment and that which could be the one the architect who designed it was most inspired by.

[11] Abramson Daniel M. Building the Bank of England Money ,architecture ,society. New Haven: Yale university press.
[12] ( same )

[13] Booker, John. Temples of Mammon. Edinburgh: Edinburgh University Press. 1990.



The Charlotte National Bank Building, Charlotte, North Carolina

THIS modern bank building is built entirely of granite for the lower part and granite terra cotta to match for the upper portions so as to save weight. The granite colums are said to be the heaviest in the states of Virginia, West Virginia, North or South Carolina.

The building as designed has special provisions for making extensions both vertically and horizontally so that when the bank needs more space it will not be necessary to make unusual alterations.

ALFRED C. BOSSOM
BANK ARCHITECT & EQUIPMENT ENGINEER
680 FIFTH AVENUE, NEW YORK

Figure 11: The descrpition of how to build a Modern Bank Building

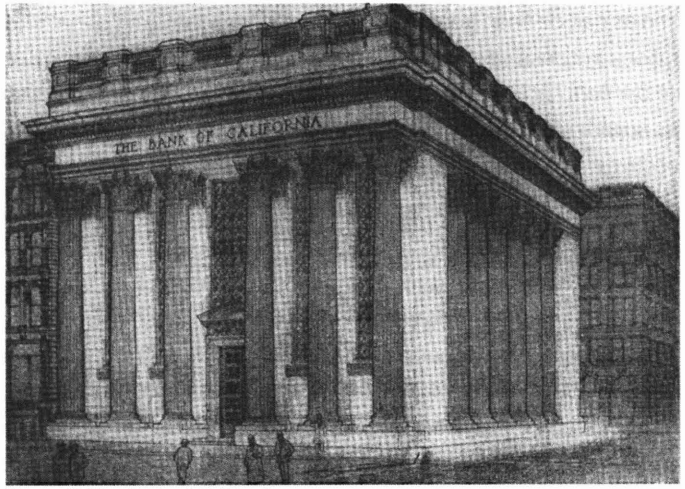



Figure 12: The Bank of California

*Goodhart-Rendel considered that "Banking houses were Italian because bankers had seen and admired the palaces Barry had built either as residences or as clubhouses for their more important depositors. This view can be broadened into the proposition that the palazzo style was middle class and therefore representative of the market which bankers were trying to attract.*[14]

The Bank building did not lend itself to developing its own identity. It was neutral and did not communicate a specificity in the development of its own stylizations. The style of the bank was a borrowed one, from churches, Greek temples and forums. Bank buildings always portrayed a sense of solidity and stability through

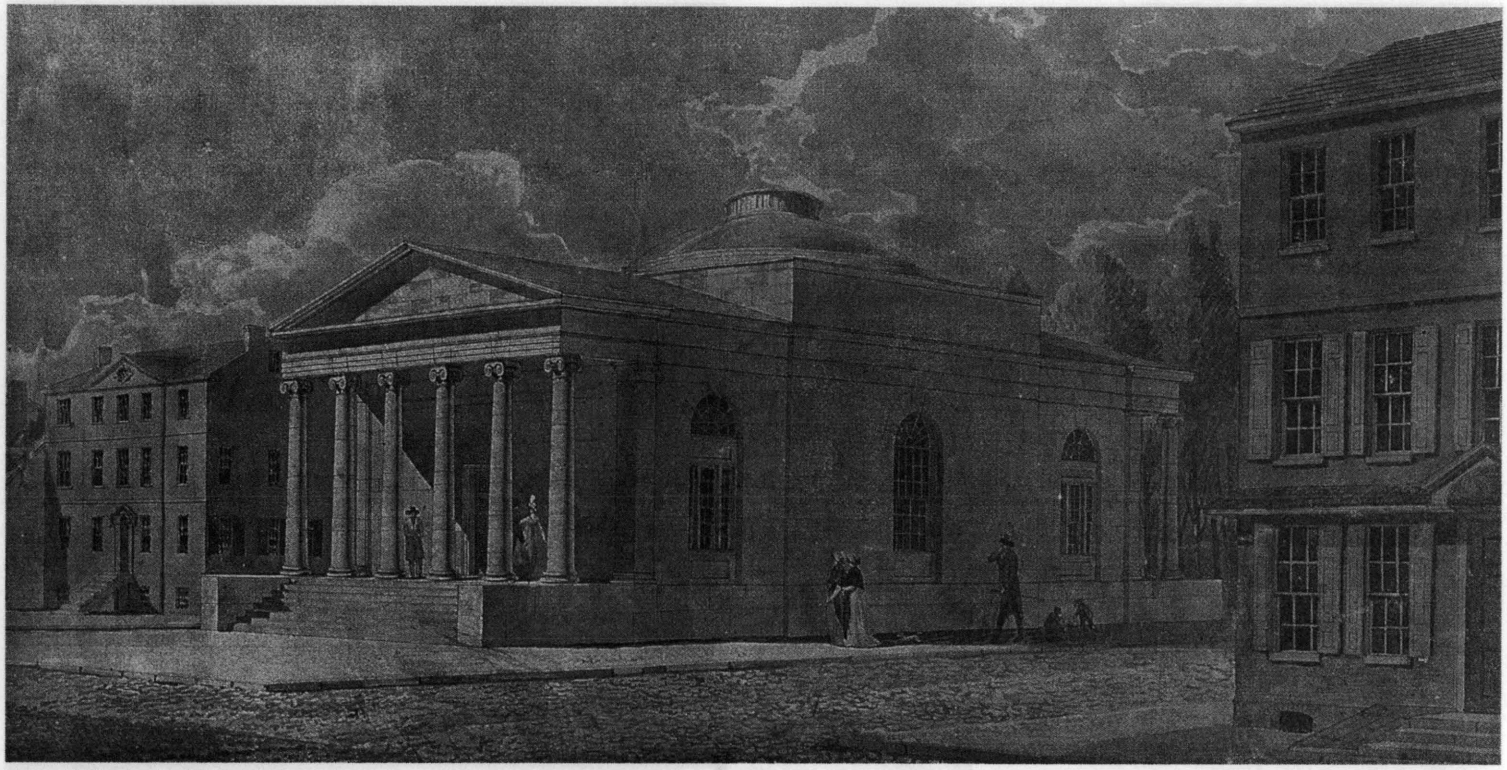


Figure 13: The Bank of Philadelphia.

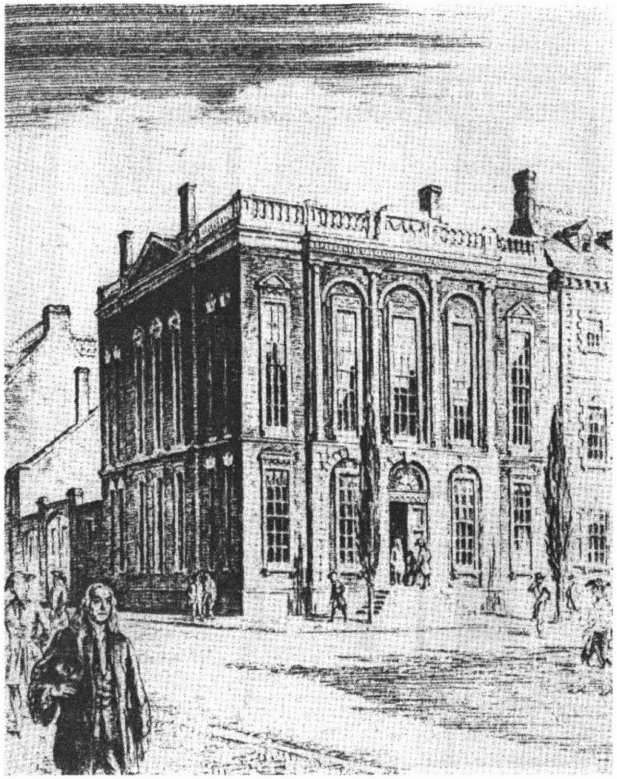


Figure 14: The Bank of New York

Figure 15: The Bank of New York

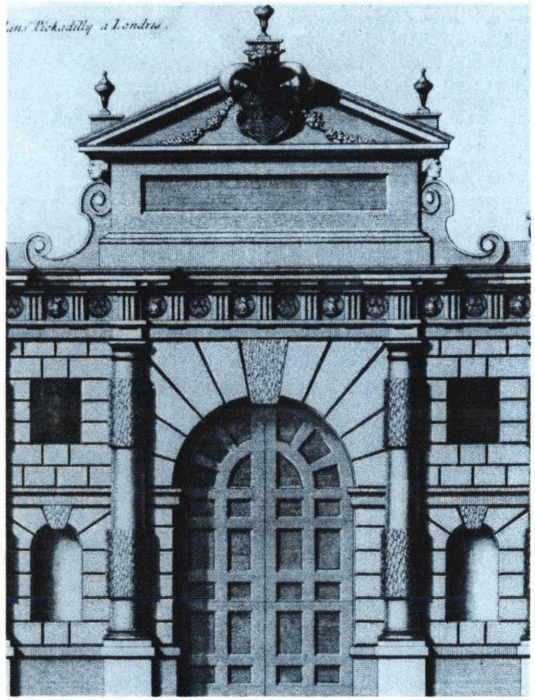


Figure 16: The Burlington Bank

Figure 17: The Bank of Philapelphia

the embodiment of these orders and principles. Yet it remains to be a question as to why the application of these random classical stylizations were necessary in building these banks during the eighteenth and nineteenth centuries.

20th Century- The Modern Tower – The Ultimate Symbol of Capitalism

The modern Bank Building is a tower, located in a densely organized downtown centre of any town. Banks and other financial services are usually located in these towers, due to their prime locations with high real estate prices. Retail banks are almost like advertisements in themselves, being able to seduce you to invest in their grand schemes. And their location on main streets is primary for their business dealings with customers. The nature of banking has changed, yet some of the old bank buildings have retained their grandeur and ornate expressions.

Marx analyses the acts of consumption and production as a constant unending cyclical process.
*Not only is production immediately consumption and consumption immediately production, not only is production a means for consumption and consumption the aim of production.... but also, each of them...creates the other in completing itself and creates itself as the other.*[15]

The down town district, or in the case of New York the city is a presentation of man's need to display the velocity of these extreme natures of consumption and production. And the towers of representing the financial centers are akin to this notion.

Spaces dissolve and disappear to be replaced by the primary signatures with

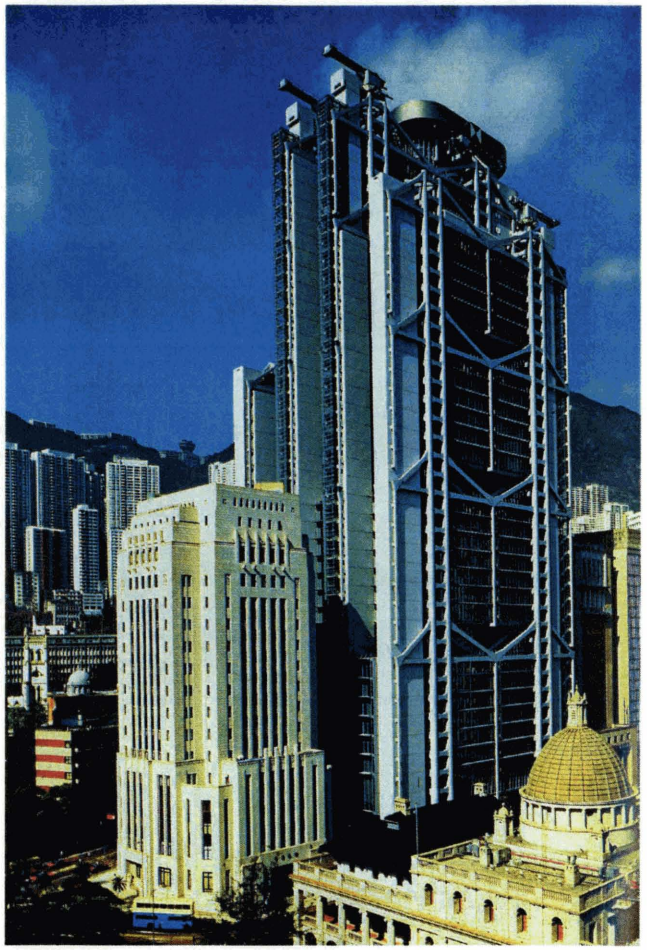


Figure 18: The Hong Kong Shanghai Bank designed by Norman Foster in Hong Kong (1979-86)



[14] Booker, John. Temples of Mammon. Edinburgh: Edinburgh University Press. 1990.(page 55)
[15] Marx 1973:93

Figure 19: Chase Manhattan in New York

Figure 20: Mellon Bank Center , Philadelphia

which we can associate meaningful fulfillment. The space disappears. A highly dense porous built landscape takes over the city. Man is truly empowered by his ability to conquer gravity through technological innovations.

The creation of Wall Street and its volatility of activity was a result of many confluences. The foremost being one of raising capital, which brought like minded traders to come together to form one of the most powerful streets in financial times. The creation of wealth became crucial at this point of history, and traders were essential to raise capital in the form of bonds and equities for the large projects in the building of the new industries and their associated infrastructure.

The Buttonwood tree marked the first primary location at which the 24 Brokers, and merchants met on May 17 1792 and signed what is known as the Buttonwood agreement. This is the first time an agreement was signed of this nature. And the Buttonwood tree which was located on the north side of Wall street, specifically between Pearl and Water streets, marked the beginnings of the New York Stock Exchange. This tree was the only one located in Wall street. It was actually claimed to be a very beautiful tree of the plane tree, known as *Planatus Occidentalis* (one of the largest hardwood trees in the Eastern United States reaching a height of 150 feet and bearing fruit which looks like a button, thus the name Buttonwood).After the signing of the agreement, the Tontine Coffehouse provided the first point where traders could actually meet and conduct business. The new

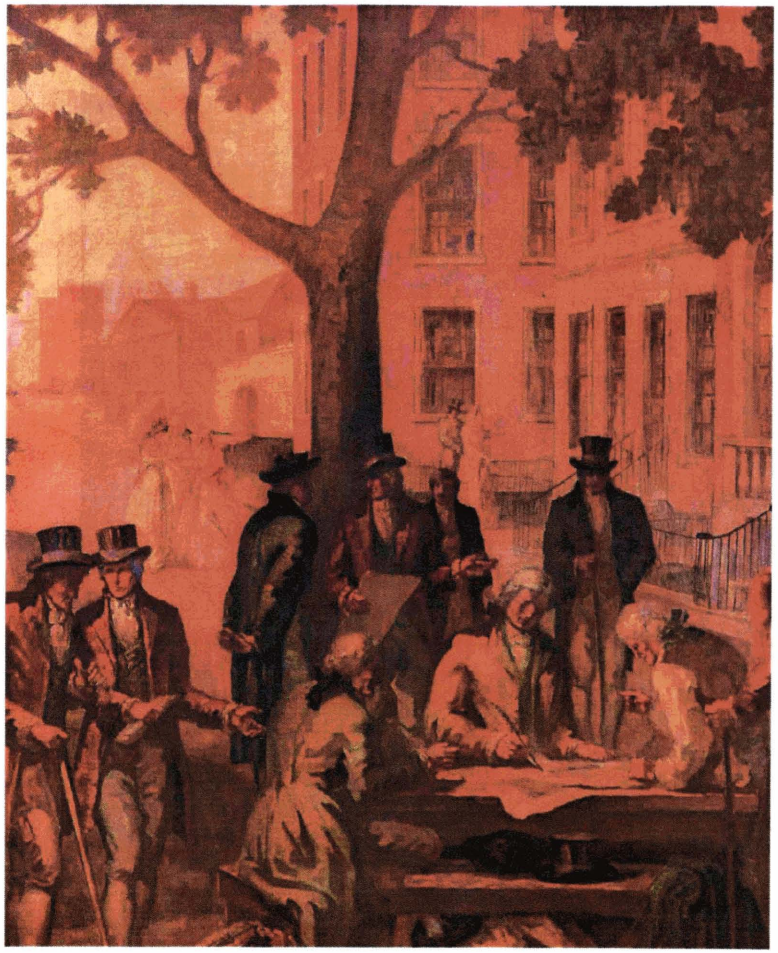


Figure 23:The Buttonwood tree on Wall Street.

Figure 24: Tontine Coffeehouse

realization of these spaces where people needed large gathering places in order to meet, was furnished by the coffeehouse in most cases. In the case of the New York stock exchange, this place came to be the "Tontine Coffeehouse" which served as one of the most luxurious spaces on Wall street. *Tontine - An investment plan in which participants buy shares in a common fund and receive an annuity that increases every time a participant dies, with the entire fund going to the final survivor or to those who survive after a specified time.*[1]

*In 1786 Wall Street consisted of fifty four merchants, a school teacher, a cloak-maker, a snuff and tobacco manufacturer, a grocer, a bookseller, a milliner, a printer, an upholsterer, two tailors, and three auctioneers. It also had a tavern, an intelligence office and a fashionable boarding house. In 1752, at the foot of Broad Street, the*

[1] http://www.thefreedictionary.com/tontine

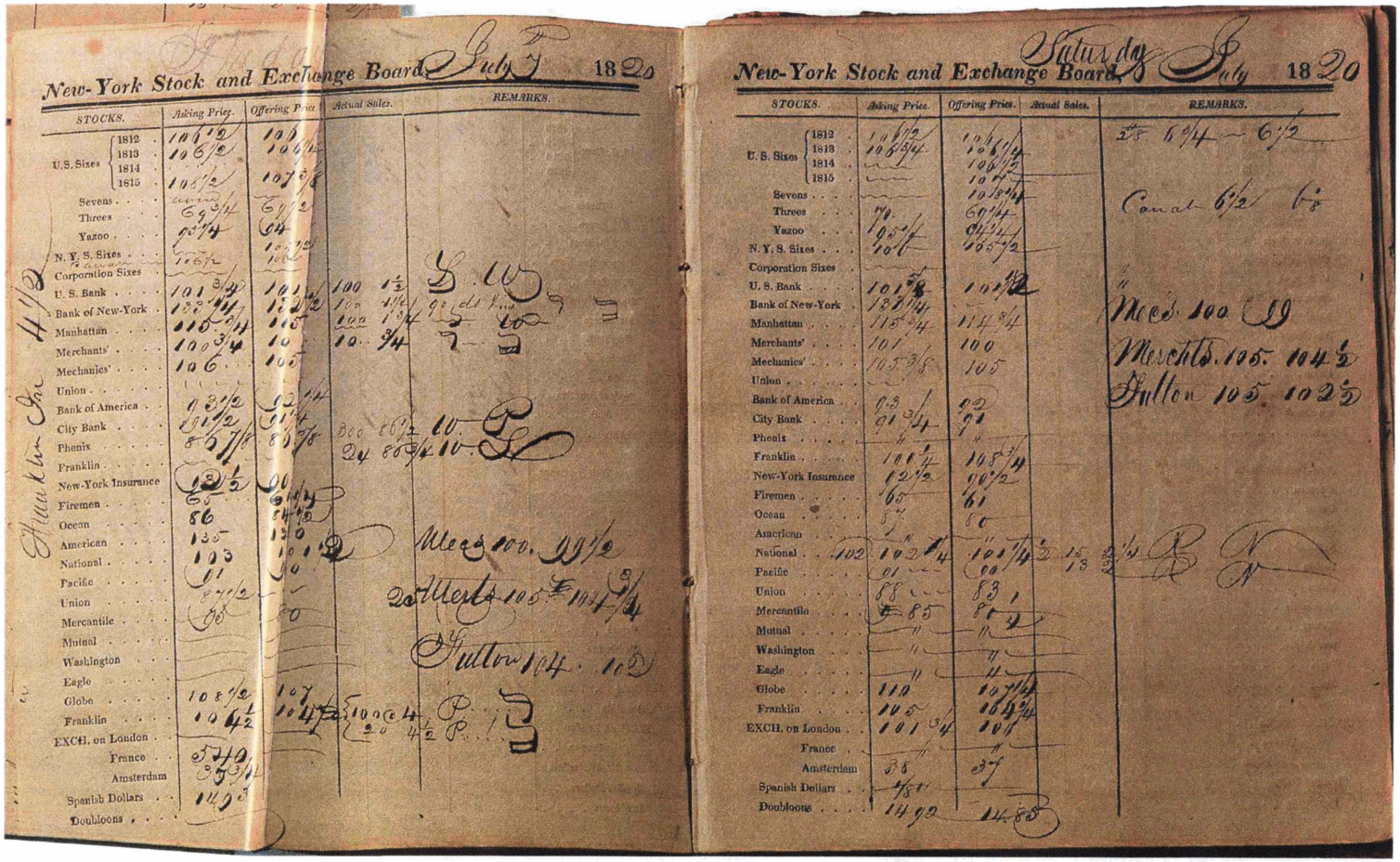



Figure 25: The signatures of the Board of the New York Stock exchange and board

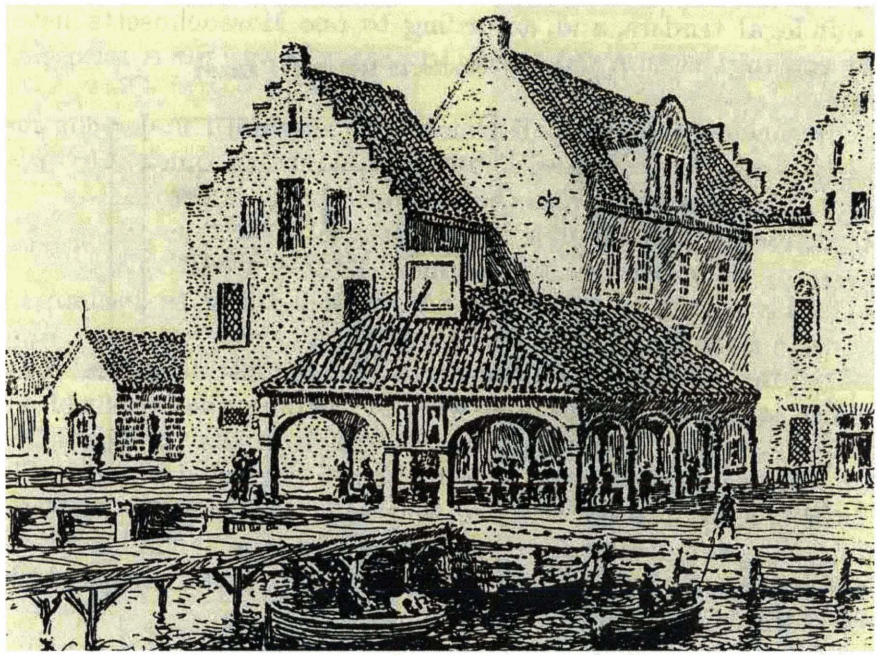


Figure 26: The Merchants exchange

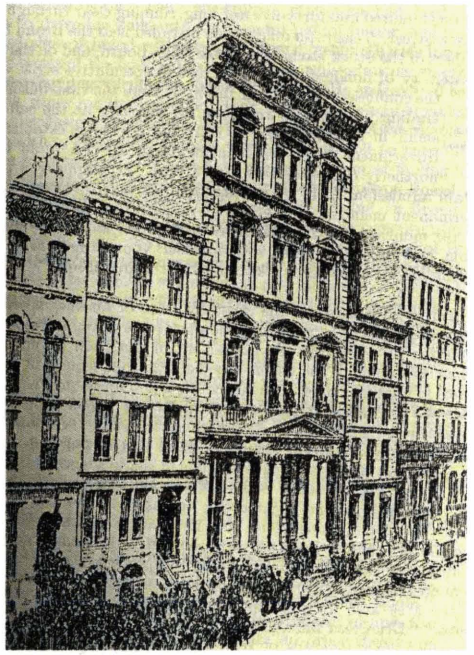


Figure 27: The New York exchange and board on Broad street (previous locations)

*Royal exchange existed, where merchants met and made their bargains.* [2]

The New York stock exchange and Board moved to the Merchants exchange building in 1827 which was located at the junction of Wall and Hanover Streets. And after its destruction a fire a second shift was made to 55 Wall Street which housed the second Merchants exchange building.

[2] Buck, James. The New York Stock Exchange First 200 years. New York:Greenwich publishing Group Inc.
[3] Buck, James. The New York Stock Exchange First 200 years. New York:Greenwich publishing Group Inc.

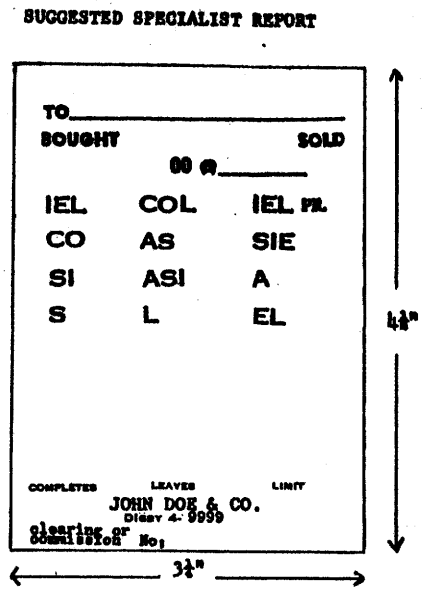
This exchange was modeled on a Greek Temple. And had close proximity to the ferry-house for quick transportation across the East river to Brooklyn.

There was competition between the New York stock exchange and the Philadelphia exchange. And New York was able to forge ahead, by being more successful due to its geographical location. Being the best harbor and its connection to the Eerie canal (seaboard gateway to the great lakes).

Due to this, New York was able to develop a successful trading industry of merchants, traders and exporters.By1844 the invention of the telegraph created a broader reach bringing about communication to investors outside New York city. The nineteenth century was a time of major infrastructure which needed to be built. Canals, railroads and roads required colossal amounts of capital, which were funded by the sale of bonds on Wall street. This creation of a vast rail road network enabled the building of new markets and connectivity, and was able to generate employment.

These benefited the economy and created a self-sufficient system which did not rely on imports from continental Europe for its development.

*1866- Inaugration of the arbritage. Opening of the Atlantic Cable*
*1867- Stock Tickers were first introduced* [4]




All lettering to be in black print.

If a Purchase, the word "Sold" to be stricken out.
If a Sale, the word "Bought" to be stricken out.

Ticker Symbol to be circled.

Report pads to be limited to approximately twelve symbols.

Figure 28:The stock with ticker symbols



[4] New York Stock Exchange Trade book archives

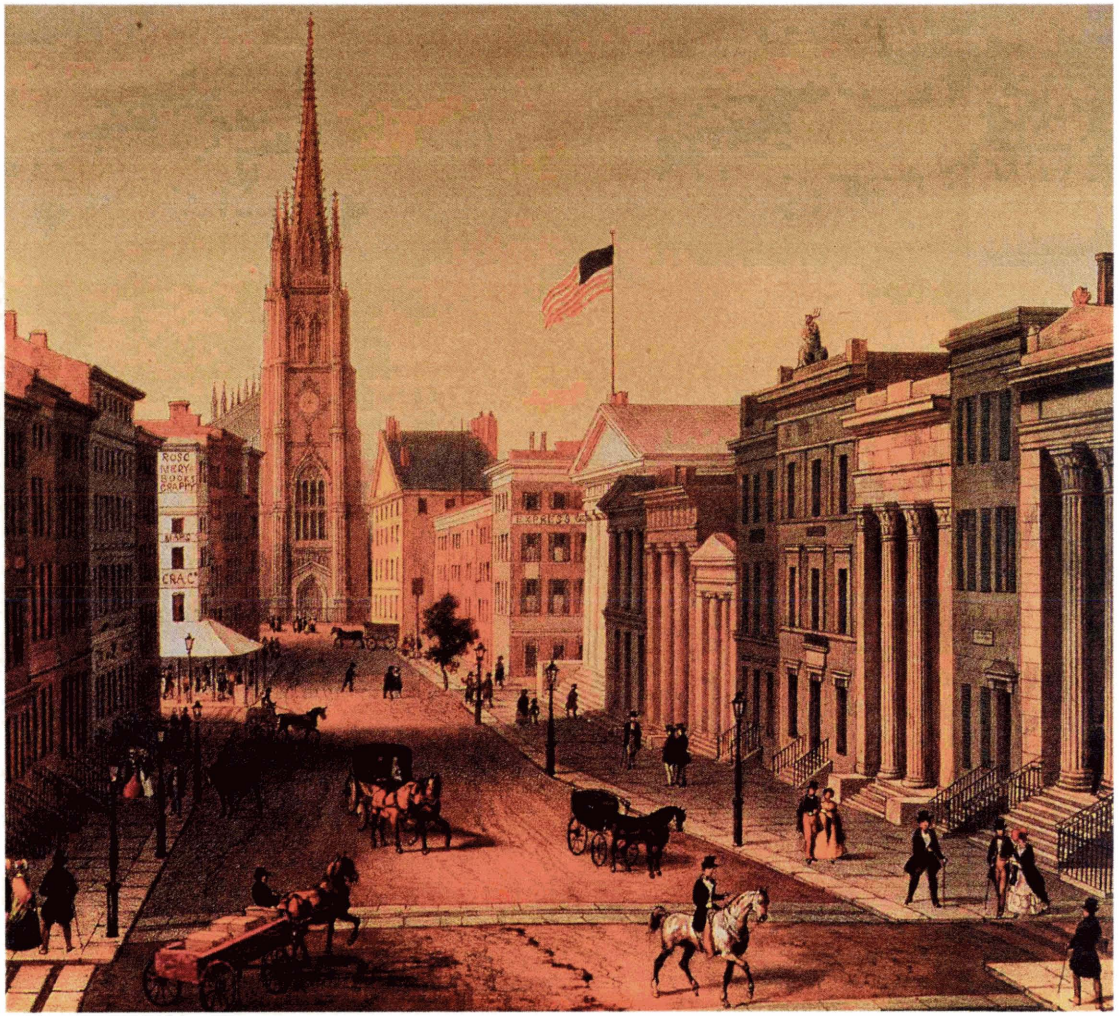


Figure 29: Wall Street

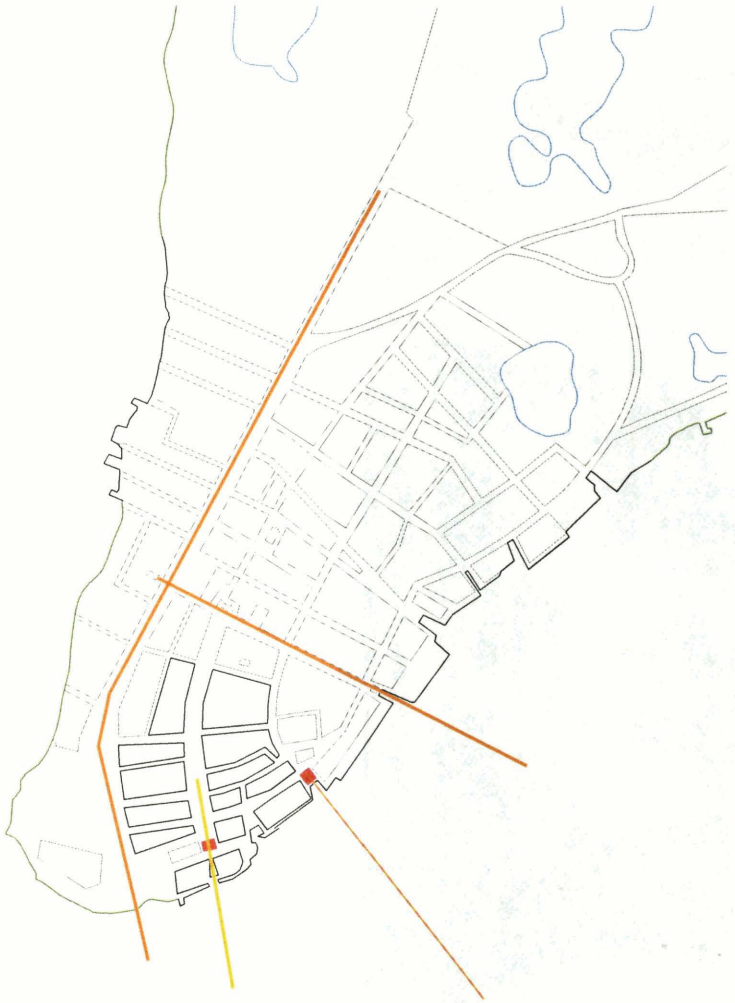


Figure 30: Lower Manhattan region in 1730 showing the Merchants exchange building and entry points to the Port

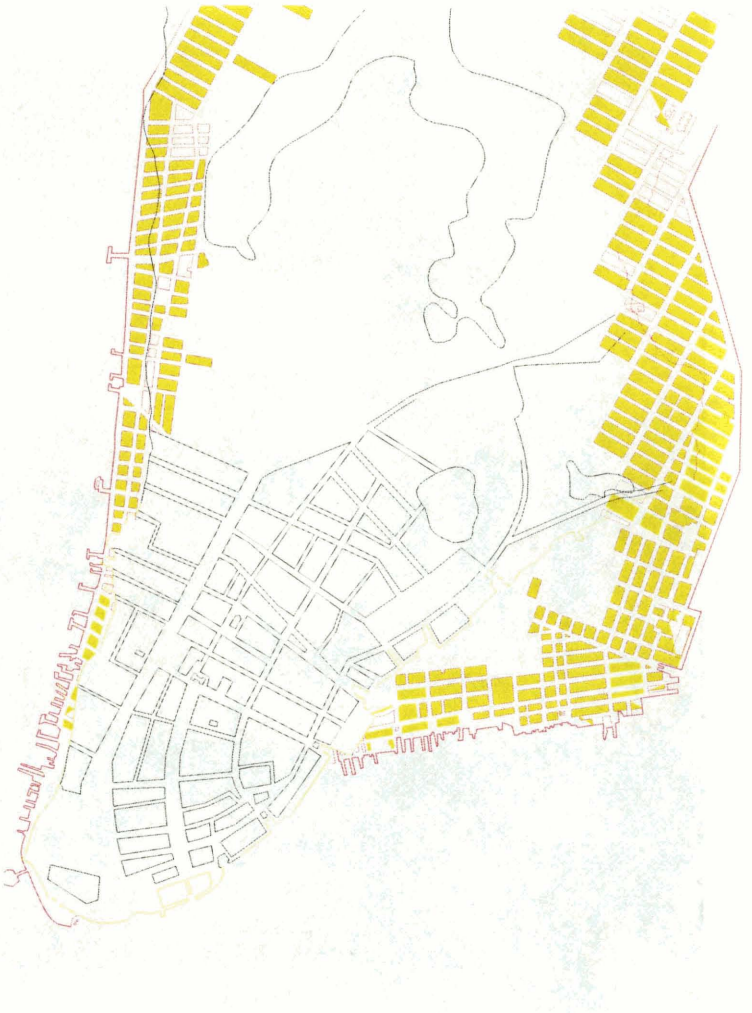


Figure 31: Lower Manhattan region in 1800 showing the expansion of the edge

Figure 32: Lower Manhattan region in 1890 showing the ferry routes and railroad connections established to the Erie canal and within the Manhattan region.

In 1865 the NYSE moved to its current location. With these new technical innovations the volumes of trade increased tremendously from 1,500 in 1861 shares per day to 505,000 in 1900. In 1871, the trading floor was expanded and the call system of trading was replaced by continuous trading. This meant that the traders who would get bids, sitting on their chairs previously, had to now stand to conduct trading. This also brought about the introduction of the specialist to the floor.

It seems to be an interesting point to note that the change in volumes of trade, which were a result of technical innovations, inevitably led to a complete re-structuring of the process of trading and the space.

And the importance of the speed of trading an order created new pressures on the "time" associated with the processing of the order. Causing more pressure on the trader (shifting their comfortable sitting position to standing positions).

These new tensions and increase in the volumes of trade put further pressure on the system to constantly innovate in order to keep moving faster and become more accurate in its data processing. Accuracy, speed of the ticker, finally led to a continuous trading time associated with the floor.

In 1881 there was a further expansion of the trading floor and an introduction of a new ventilation system which introduced

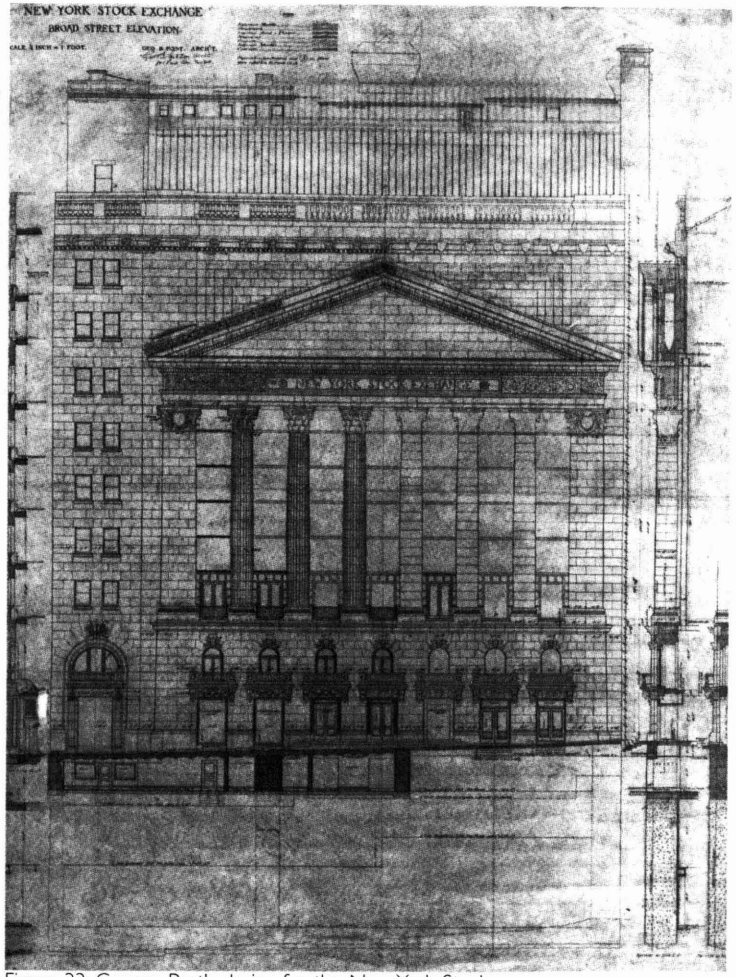


Figure 33: George Post's design for the New York Stock Exchange on Wall street

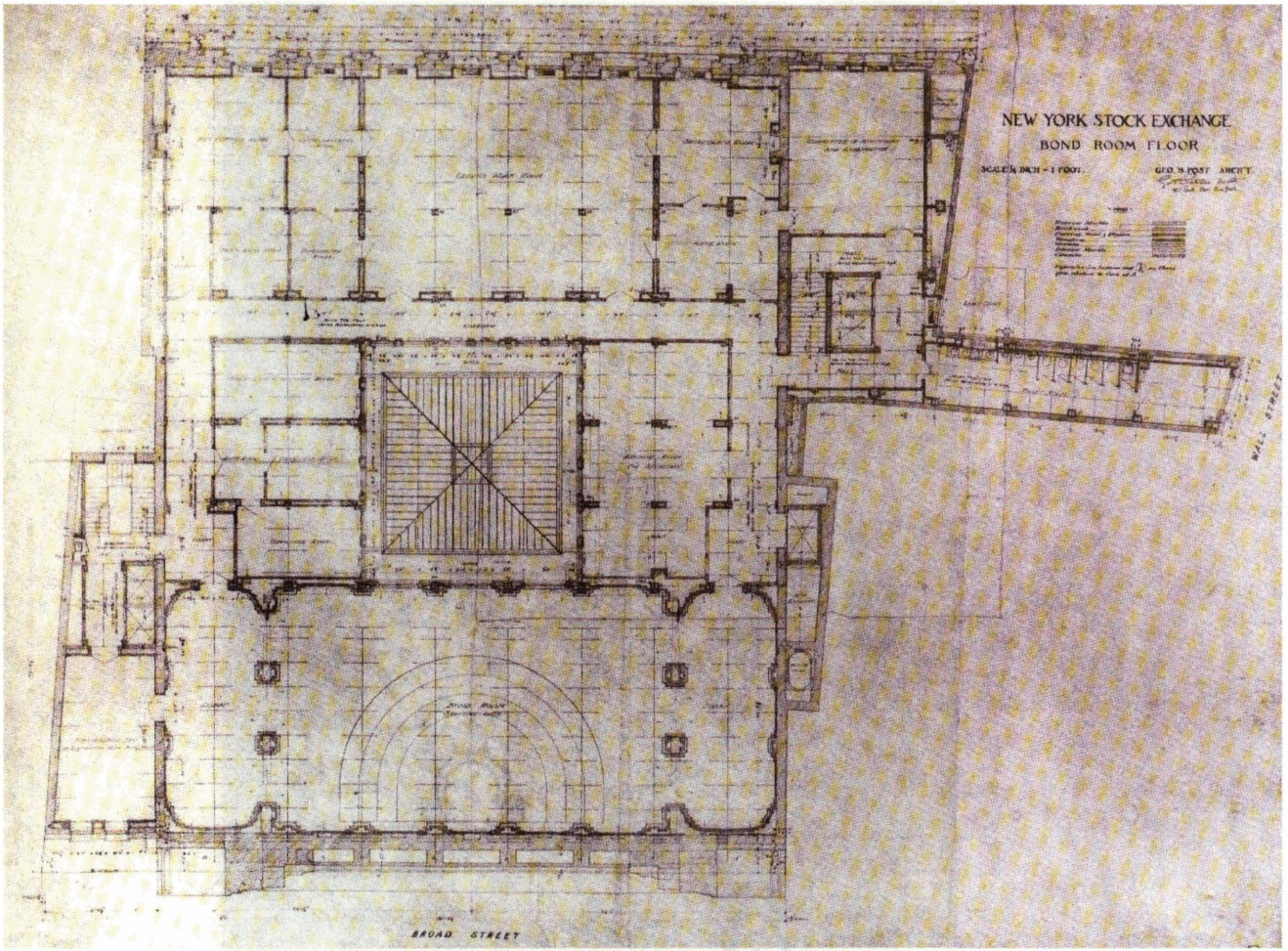


Figure 34: George Post's design for the New York Stock Exchange on Wall street


Figure 35:: NYSE


Figure 36: Wall street during the nineteenth century

The Atlantic cable and the stock ticker, were responsible in creating an efficiency which surpassed that of the London stock exchange at this moment in history. This was the first time, the use of mechanical means of processing orders was able to enhance the system.

In 1865 the NYSE moved to its current location. With these new technical innovations the volumes of trade increased tremendously from 1,500 in 1861 shares per day to 505,000 in 1900.

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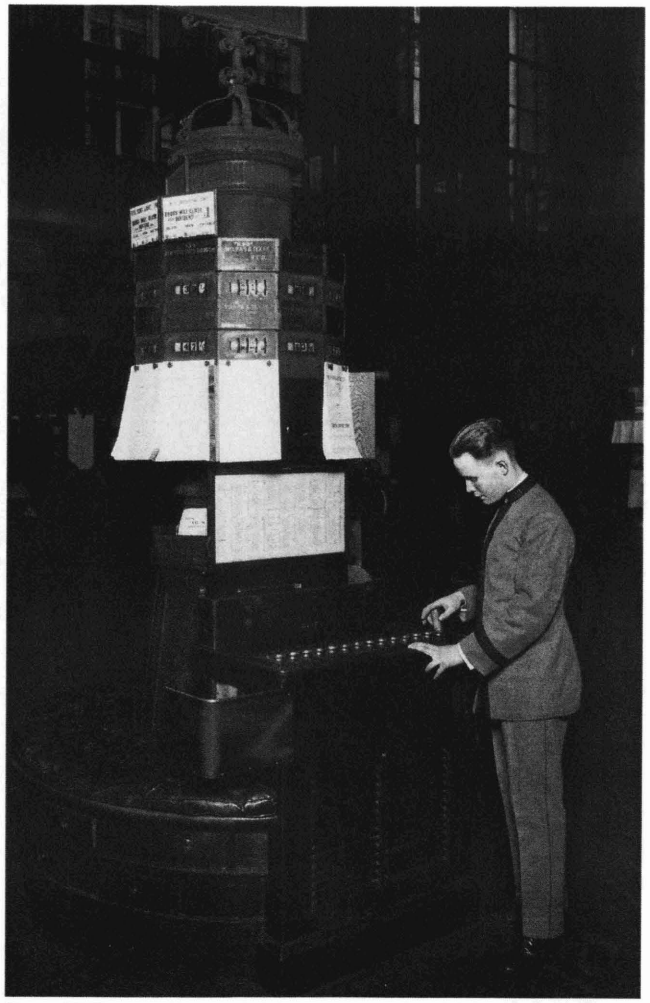


Figure 37:The new Pneumatic tube stations at the NYSE

Figure 38 The new use of the stock ticker and the telephone at the NYSE

Figure 39: The new use of the telephone at the curb exchange, where traders usually traded at the curb. This was the beginnings of AMEX.

with the floor.

In 1881 there was a further expansion of the trading floor and an introduction of a new ventilation system which introduced fresh scented air into the trading floor. The design of the NYSE was undertaken by George B Post who's neoclassical design was selected from an architectural competition. The Corinthian columns on the façade, at the entrance create an imposing sense of powered meaning to the street.

*Nov 13 1878- First telephone was introduced in the exchange*[4]

1903 The NYSE moved into new Quarters on 18 Broad Street. The new trading floor which is the present one, is sixty percent larger than the previous one. There is also said to be an introduction of air conditioning system which was one of the first at this moment. After the First world war, there was a major change as the United states emerged as a creditor and not a debtor. And this brought about a sense of leadership for Wall street which was at the center for investment capital.

The next introduction to the existing building was the addition of a 23- storey office tower with additional trading rooms in 1922. And the introduction of many in-house facilities which would be required by the traders like barbers, a small hospital for emergencies, a gymnasium etc which contributed to the many additions which would be required to make the New York Stock exchange a luxurious place to be.

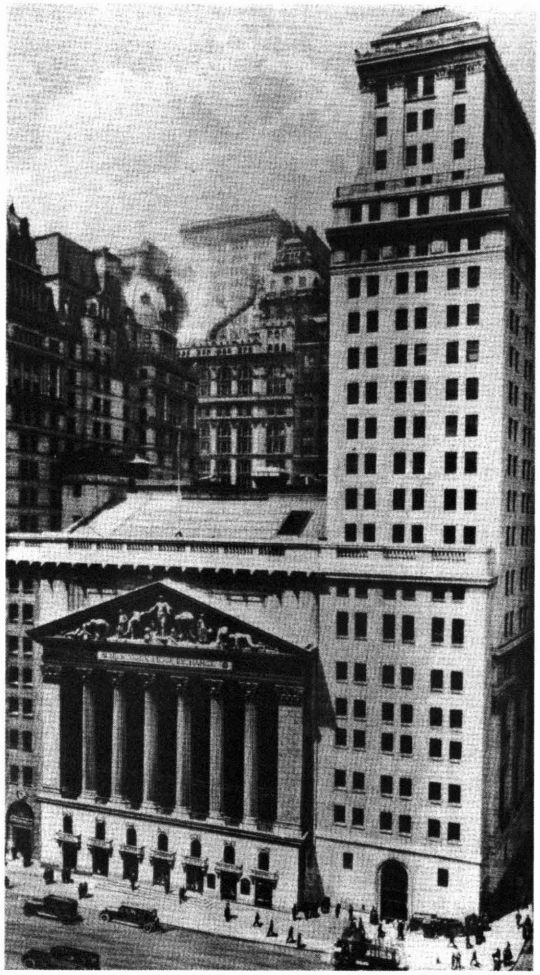
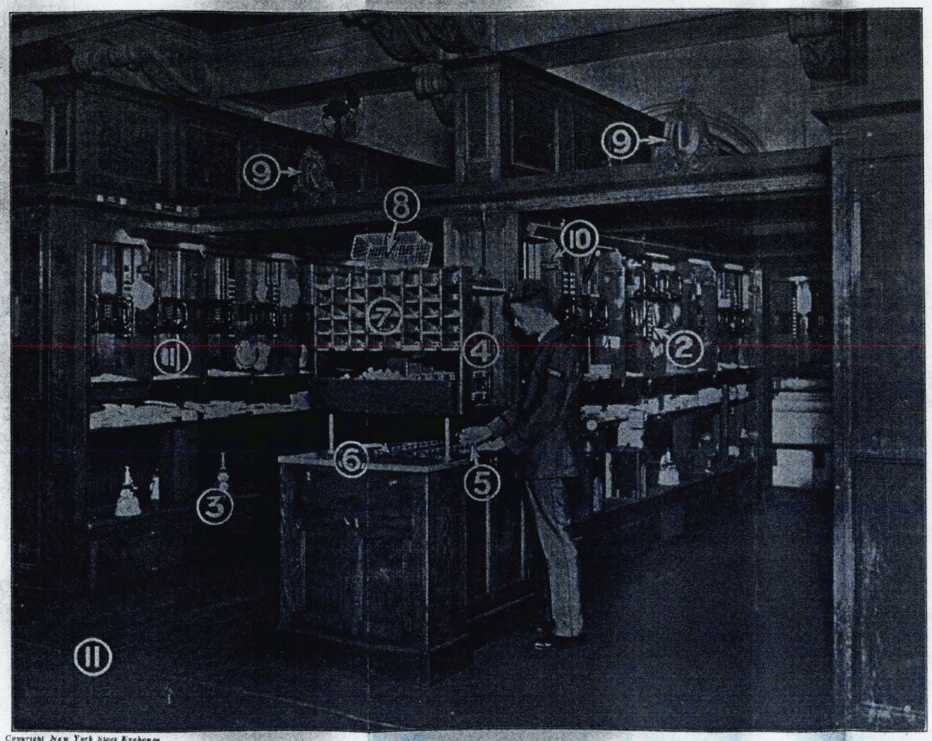


Figure 40 The addition of the 23 storeyed block to the NYSE



[4] New York Stock Exchange Trade book






TELEPHONE BOOTHS K AND L

[1] Telephone space, in front of which the telephone clerk stands. Blank order pads are on the shelf below the telephone.

[2] Key used to "put up" the member's number on the large wall annunciator board, notifying him to come, or send a page, to the telephone clerk for the order.

[3] Time clock used mainly to time-stamp odd-lot orders.

[4] Post sorting cubicles. If a number of odd-lot orders are handed to the tube man by the telephone clerks, he sorts them according to the posts where the stocks are traded before sending them out to their proper post.

[5] Tubeman sending an odd-lot order to a trading post via the pneumatic tubes.

[6] Trough into which "carriers" drop. These carriers contain the reports of executed orders sent via the pneumatic tube from the post where the stock is traded.

[7] Pigeon-holes or cubicles. When the reports of executions of orders are received from the post, they are placed in the firm's pigeon-hole. The telephone clerk removes them, telephones the report to the firm.

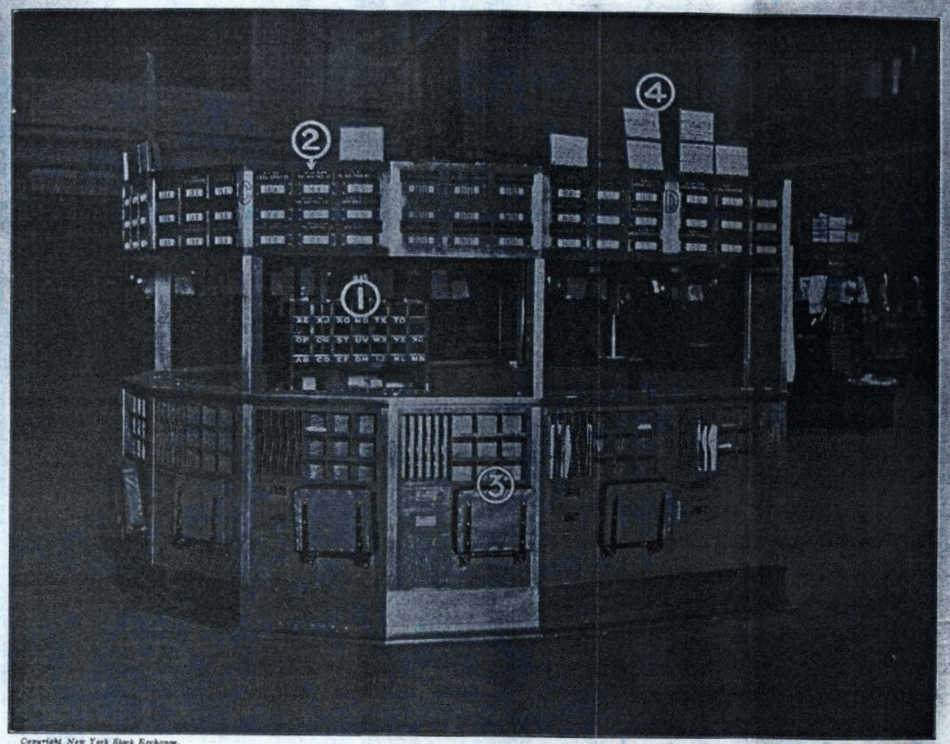
[8] Wire basket into which reports in sealed envelopes are dropped by the telephone clerks after reporting the executions over the telephone to the office. Messengers collect them and take them to the firm's box in the Distributing Department [a sort of post office]. Messengers from the firms take them back to the offices.

[9] Letter designating booth location. [See space K, space L and tube station KL on Floor map, preceding page 47.]

[10] Firm's name plate.

[11] Brass strip on Floor marking the boundary of the Floor space, beyond which the telephone clerks may not go during trading hours [10 A.M.–3 P.M.].

Figure 41: Telephone Systems






TRADING POST NO. 3

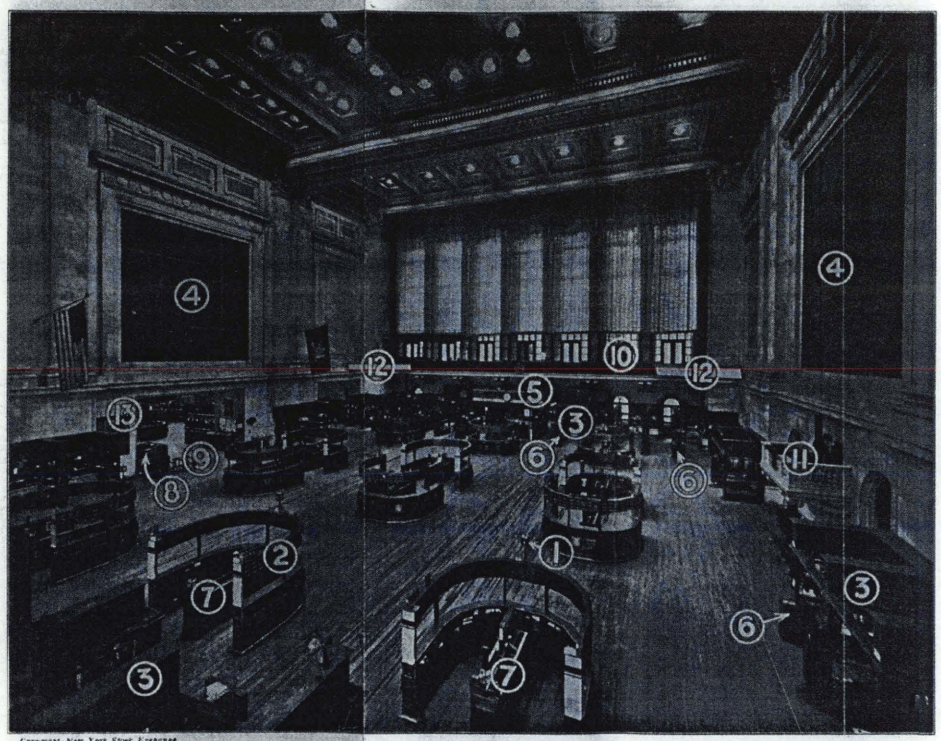
[1] Pigeon-holes used to sort reports of executions of orders just previous to their return via pneumatic tube to the firms' telephone booths.

[2] Price indicator used to show the price of the last sale. There is an indicator for each stock at the post, in front of which the trading in that stock takes place. After every sale it is adjusted, if the price changes, to agree with the price of that sale. Before the opening at 10 A.M. all indicators are set at zero.

[3] Pigeon-holes sometimes used by specialists to sort orders.

[4] Notices referring to dates when stockholders of record become entitled to dividends, date of payment, announcement of stockholders' meetings and issuance of rights.

Figure 42




Copyright New York Stock Exchange.
900

TRADING FLOOR OF THE NEW YORK STOCK EXCHANGE

[1] Post 4. General Motors is traded in front of this post.

[2] Price indicators, in front of which specialists in particular stocks will be found. The trading takes place here. Specialists' clerks stand just inside the posts.

[3] Telephone booths. When orders are telephoned to the Floor of the Exchange they are received here by telephone clerks over direct wires connecting them with the office of their firm.

[4] Annunciator board. Numbers of members are "put up" here when the members are wanted by their telephone clerks. It is a method of paging the member.

[5] Platform from which the ticker is operated. A direct pneumatic tube from each post to this platform brings the reports of sales to the ticker operators.

[6] Booth pneumatic tube stations used to send odd-lot orders out to the post where the particular stocks are traded.

[7] Post pneumatic tube stations where odd-lot orders are received and reports of executions of orders sent back to the firm's booth station.

[8] Money Desk.

[9] Opening leading to the "Garage"—an addition to the Floor in the main room where other stocks are traded.

[10] Visitors' gallery.

[11] Rostrum from which the Exchange is opened and closed by the ringing of a gong.

[12] Ticker tape, or Trans-lux, upon which sales reported on the ticker are reflected, so that they can be conveniently seen by all members.

[13] A directory of stock locations.

Figure 43

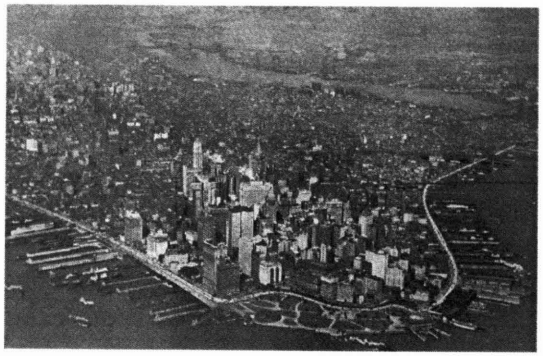
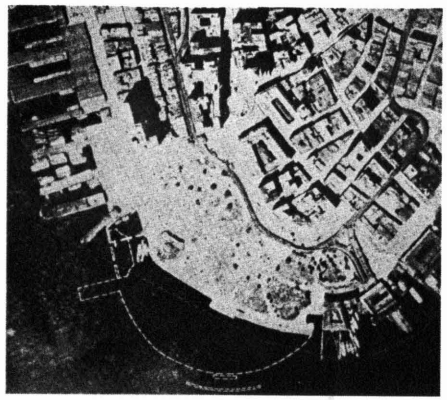


Figure 44: An aerial view of the Lower Manhattan region in 1950



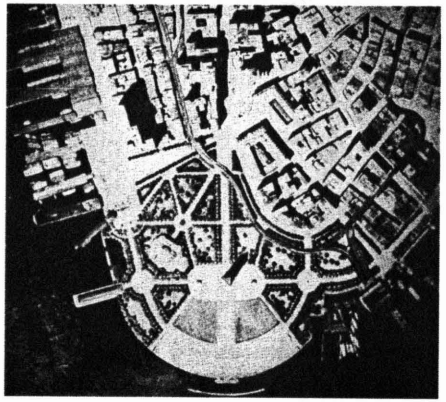


Figure 45: The creation of Battery Park

Figure 46: Inside the NYSE

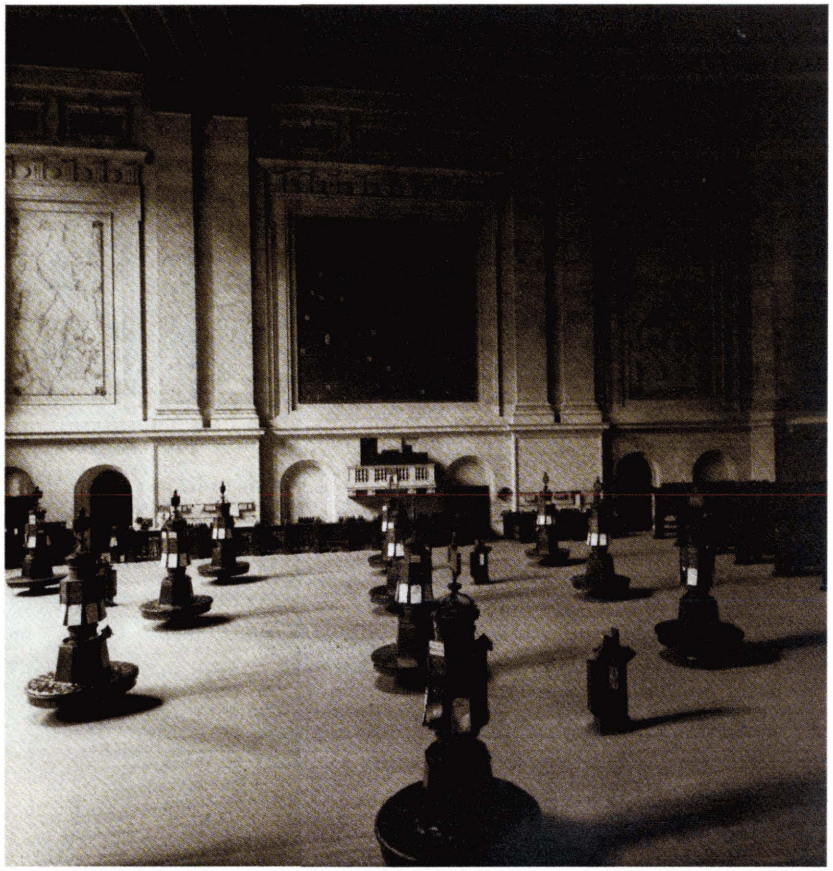


Figure 47: Inside the NYSE

Figure 48 Inside the NYSE

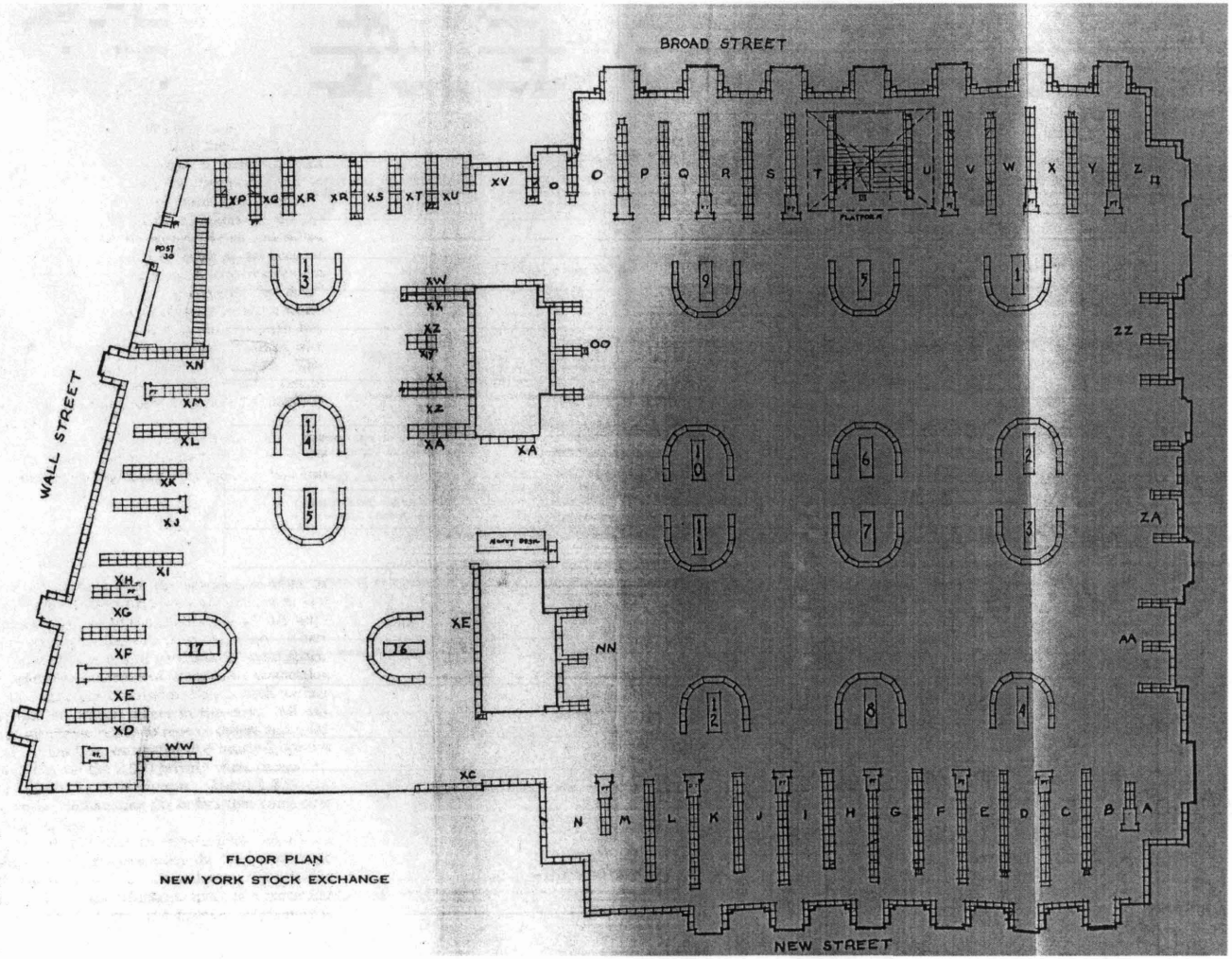



Figure 49: Plan of the NYSE

NYSE 6847

July 18, 1956

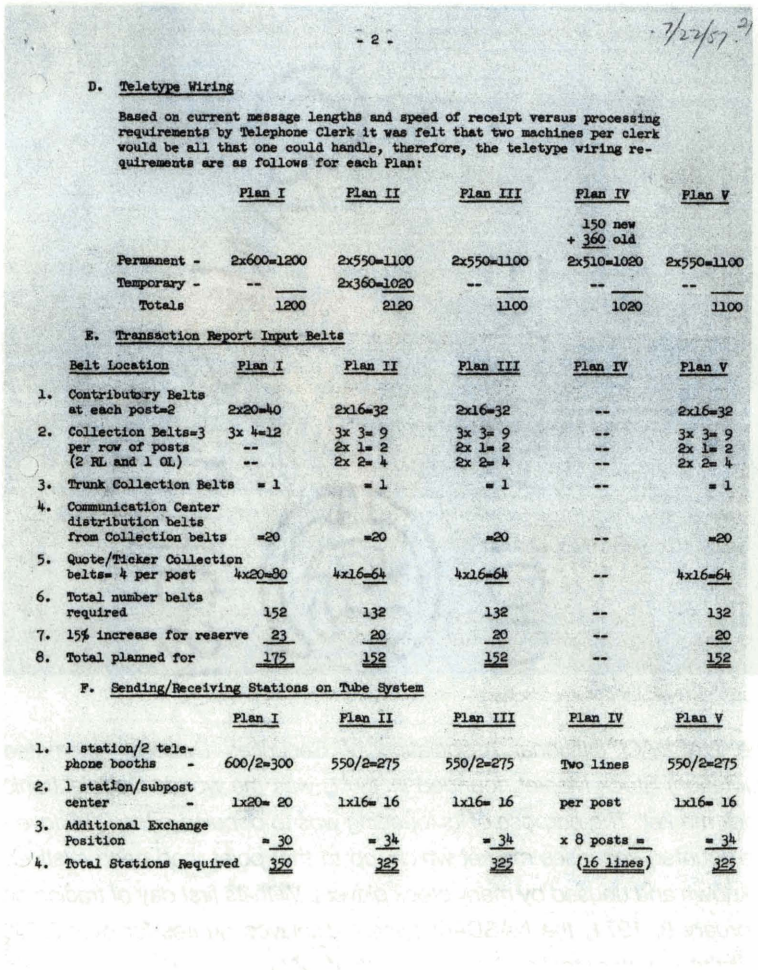
2.4 Transportation ( Circulation of Floor Population)

Members and Employees

| Type | No. | Location of Primary Activity | Circulation Requirements | Specific Movements | Purpose |
|---|---|---|---|---|---|
| Commission House Broker | 342 | All trading locations | 100% flexibility required | Booth to post<br>Post to booth<br>Post to post | To trade or get quote<br>To receive information or give report |
| Commission House Tel. Clerk | 359 | At communication contact point with office | Fixed-mobility for personal requirements only | None | |
| Specialist | 357 | Specific trading location | | Post to post | To trade |
| Specialist-Clerk | 206 | Specific trading location | Fixed-mobility for personal requirements only | None | |
| Trader | 9 | All trading locations | 100% flexibility required | Booth to post<br>Post to booth<br>Post to post | To trade<br>To give report<br>To trade |
| Trader-Clerk | * | At communication contact point with Trader | Fixed-mobility for personal requirements only | None | |
| $2 Broker | 141 | All trading locations | 100% flexibility required | Booth to post<br>Post to booth<br>Post to post | To trade or get quote<br>To receive information or give report<br>To trade or get quote |
| Odd-Lot Dealers | 108 | Specific group of trading locations | Fixed partial flexibility required | Post to booth<br>Post to post | To instruct Tele. Clerk<br>Trade in full lots |
| Odd-Lot Dealer's Clerk | 99 | At communication contact point with office | Fixed-mobility for personal requirements only | None | |
| Commission House Floor Supervisor | ** | All trading locations | 100% flexibility required | Post to booth<br>Booth to post<br>Post to post<br>Booth to booth | To supervise brokers' clerks |
| Odd-Lot Dealer Floor Supervisor | *** | All trading locations | 100% flexibility required | Post to post | To supervise Assoc. Brokers |
| Temp. Badge or Relief Clerks | 420 | Relief of space clerks, tele. clerks or as Revenues | Access to specific trading location and/or communication contact point | None | |
| Bond Brokers | 14 | | | | |
| Bond Clerks | 42 | | | | |

* Included in Commission House Tele. Clerks
** Included in Commission House Broker
*** Included in Odd-Lot Dealers

Figure 50: NYSE DATA FILES



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7/22/57

D. Teletype Wiring

Based on current message lengths and speed of receipt veraus processing requirements by Telephone Clerk it was felt that two machines per clerk would be all that one could handle, therefore, the teletype wiring requirements are as follows for each Plan:

| | Plan I | Plan II | Plan III | Plan IV | Plan V |
|---|---|---|---|---|---|
| | | | | 150 new + 360 old | |
| Permanent - | 2x600=1200 | 2x550=1100 | 2x550=1100 | 2x510=1020 | 2x550=1100 |
| Temporary - | -- | 2x360=1020 | -- | -- | -- |
| Totals | 1200 | 2120 | 1100 | 1020 | 1100 |

E. Transaction Report Input Belts

| Belt Location | Plan I | Plan II | Plan III | Plan IV | Plan V |
|---|---|---|---|---|---|
| 1. Contributory Belts at each post=2 | 2x20=40 | 2x16=32 | 2x16=32 | -- | 2x16=32 |
| 2. Collection Belts=3 per row of posts (2 RL and 1 OL) | 3x 4=12<br>--<br>-- | 3x 3= 9<br>2x 1= 2<br>2x 2= 4 | 3x 3= 9<br>2x 1= 2<br>2x 2= 4 | --<br>--<br>-- | 3x 3= 9<br>2x 1= 2<br>2x 2= 4 |
| 3. Trunk Collection Belts | = 1 | = 1 | = 1 | -- | = 1 |
| 4. Communication Center distribution belts from Collection belts | =20 | =20 | =20 | -- | =20 |
| 5. Quote/Ticker Collection belts= 4 per post | 4x20=80 | 4x16=64 | 4x16=64 | -- | 4x16=64 |
| 6. Total number belts required | 152 | 132 | 132 | -- | 132 |
| 7. 15% increase for reserve | 23 | 20 | 20 | -- | 20 |
| 8. Total planned for | 175 | 152 | 152 | -- | 152 |

F. Sending/Receiving Stations on Tube System

| | Plan I | Plan II | Plan III | Plan IV | Plan V |
|---|---|---|---|---|---|
| 1. 1 station/2 telephone booths - | 600/2=300 | 550/2=275 | 550/2=275 | Two lines | 550/2=275 |
| 2. 1 station/subpost center - | 1x20= 20 | 1x16= 16 | 1x16= 16 | per post | 1x16= 16 |
| 3. Additional Exchange Position | = 30 | = 34 | = 34 | x 8 posts = (16 lines) | = 34 |
| 4. Total Stations Required | 350 | 325 | 325 | | 325 |

Figure 51: NYSE DATA FILES

*The new skyscraper provided enlarged trading and office space for the exchange.The new trading room was dubbed as the "Garage", because it was an addition to the main room. The name has stuck to this day. Stocks were traded in the Western Edeg of the garage; the exchange now had 25 trading posts accommodating 530 listed issues. Like the 1903 structure, the 23- story addition featured many technical and engineering innovations. The elevators were said to be the fastest in the world. The trusses of the new trading room , supporting the entire building above, weighed from 101 to 137 tons each and were believed to be the heaviest ever used in office building construction to that time.*[5]

The ideas with which the extension of the NYSE was built was to create the oppurtunity to be able to forge ahead with this identity of being the best "technically most advanced" structure of its time to forge ahead. In the creation of the most advanced systems of building and instruments which shall be able to communicate in the most effiecient modality in order to create a position of power. The technology merged as a system of building this environment, making it almost like a laboratory in its processing of information. And the instruments and environments had to be continuously updated in order to compete with other systems.

This idealized environment of design will be able to inform the public of its power through its public image of being able to surpass all the buildings of its time in its instrumentization (technical data and modality of distribution).

*1964- New ticker system- 900 characters a minute*

*1965- Fully automated service introduced*

*1965- Electronic system centre created*

*1966- Transmission of trade and quote data from fully automated floor*

*1968- Five day settlement adopted*

*1969- Central certificate fully activated*

*1970- Block automation system began operation*

*1970- Public ownership of members approved*

*1971- NYSE Incorporated*

*1971 – NASDAQ was established*[5]

This chronology of the progress of the NYSE establishes the fact that a faster ticker system was able to replace the old one and the constant search to switch from manual processing of data, finally reached to a point when the NYSE reached a stage that it needed to be closed down as it was not able to handle the data coming in. And this led to the establishment of a fully automated system. In parallel to these accomplishments, the NASDAQ was created as is explained below:

[5] New York Stock Exchange Trade book archives

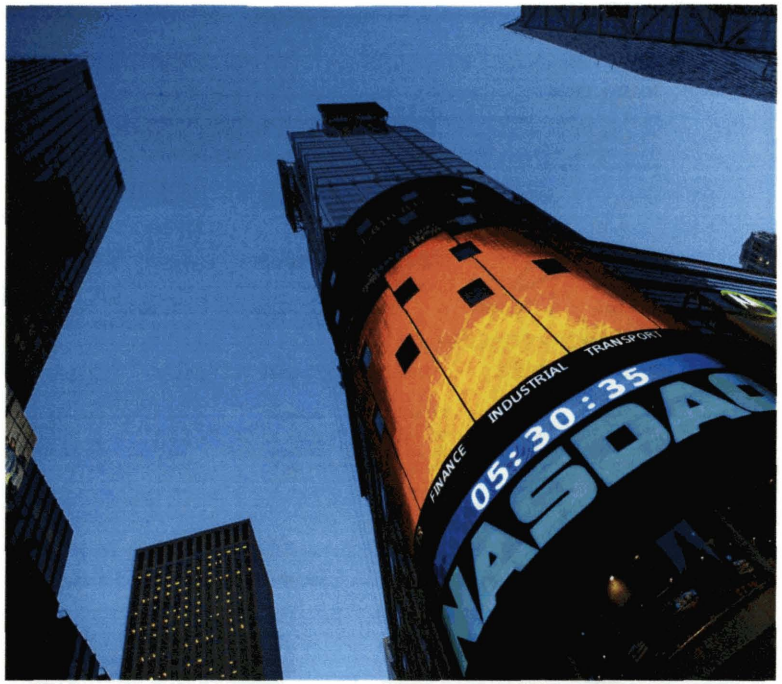
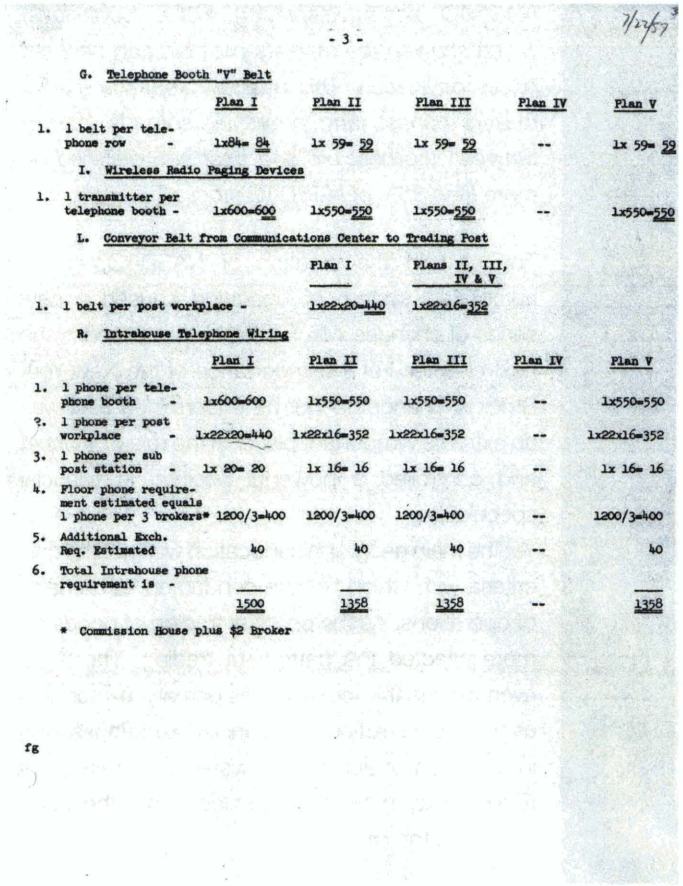



Figure 52: NASDAQ Times Square

*The NASDAQ (National Association of Securities Dealers Automated Quotation) Stock Market, founded in 1971, was the worlds first electronic stock market. The purpose of its founding was to popularize the OTC (over-the-counter) securities market which, up to that point, had been relatively unknown and unused by many stock players. With its first day of trading on February 8, 1971, the NASDAQ system displayed quotes for over 2,500 over-the-counter stocks. By 1975, the NASDAQ displayed only NASDAQ-listed stocks, separating itself from other OTC stocks. Five years later the*



- 3 -

7/22/57

G. Telephone Booth "V" Belt

| | Plan I | Plan II | Plan III | Plan IV | Plan V |
|---|---|---|---|---|---|
| 1. 1 belt per telephone row - | 1x84= 84 | 1x 59= 59 | 1x 59= 59 | -- | 1x 59= 59 |

I. Wireless Radio Paging Devices

| | | | | | |
|---|---|---|---|---|---|
| 1. 1 transmitter per telephone booth - | 1x600=600 | 1x550=550 | 1x550=550 | -- | 1x550=550 |

L. Conveyor Belt from Communications Center to Trading Post

| | Plan I | Plans II, III, IV & V |
|---|---|---|
| 1. 1 belt per post workplace - | 1x22x20=440 | 1x22x16=352 |

R. Intrahouse Telephone Wiring

| | Plan I | Plan II | Plan III | Plan IV | Plan V |
|---|---|---|---|---|---|
| 1. 1 phone per telephone booth - | 1x600=600 | 1x550=550 | 1x550=550 | -- | 1x550=550 |
| 2. 1 phone per post workplace - | 1x22x20=440 | 1x22x16=352 | 1x22x16=352 | -- | 1x22x16=352 |
| 3. 1 phone per sub post station - | 1x 20= 20 | 1x 16= 16 | 1x 16= 16 | -- | 1x 16= 16 |
| 4. Floor phone requirement estimated equals 1 phone per 3 brokers* | 1200/3=400 | 1200/3=400 | 1200/3=400 | -- | 1200/3=400 |
| 5. Additional Exch. Req. Estimated | 40 | 40 | 40 | -- | 40 |
| 6. Total Intrahouse phone requirement is - | 1500 | 1358 | 1358 | -- | 1358 |

* Commission House plus $2 Broker

fg

Figure 53: NYSE DATA

April 29, 1957

TO: Special Committee on Studies of Exchange Mechanical and Physical Facilities

FROM: Messrs. Carlisle & Jacquelin and De Coppet & Doremus

SUBJECT: Ebasco Progress Report #3, Odd-Lot Processing

* * * * * * * * * * *

Ebasco has made three separate proposals affecting odd-lot operations on the New York Stock Exchange. Plan A, the all electronic system, proposes the design and acquisition of a computer which will (1) accept and store orders received through an input center, (2) execute these orders on the basis of information received from the round-lot market, and (3) process and report the resulting transactions to the commission houses and to the odd-lot dealers, respectively, in machine language, in written form or both. Ebasco estimates that the gross operating cost of this equipment will be $970,000. a year. They foresee certain offset savings which we do not believe are possible of accomplishment.

We are opposed to Plan A for several reasons. We strongly object to mechanical odd-lot executions and order handling. Delegation to a machine of the all-important function of personal membership execution of orders is a reversal of a long standing philosophy. The public customer's rights must be safeguarded at all times. Under the present system there is direct personal responsibility on the part of a Stock Exchange Member for every operation affecting the execution of an order and its subsequent processing. Under Plan A the direct personal membership responsibility is lost. It is a grave question as to who, under these circumstances, would be responsible for the safeguarding of the customers' interests once an order has been entered into the electronic computer.

Another reason is that the cost seems to us to be extremely high and out of proportion to any improvement in service.

Also very important are the limitations introduced by the machine. The input center constitutes a bottleneck for the entire odd-lot operation. Ebasco's proposals for circumventing this bottleneck are wholly unsatisfactory to the odd-lot dealers.

In addition, breakdowns in the machine would necessitate immediate cessation of round-lot trading. At the time of a breakdown no one could foretell how long it would take to restore the execution machine to working order and the odd-lot dealers could not possibly risk being responsible for the adjustments they would have to make in the event the auction market continued and they had to adjust to prices which the customer would be entitled to as of the time he entered his order.

Figure 54: NYSE FLOOR

*NASDAQ began displaying inside quotations, which showed the markets best bid and best sell prices on screen. This basically kept the market makers honest, and published spreads (margin between the best bid and best sell) declined on more than 85% of NASDAQ stocks.*[6]

The shift in the creation of NASDAQ, as an automated system of operation caused a new series of changes which shall be discussed in the next chapter. Yet the importance of the New York Stock exchange cannot be undermined as it was an extremely important player in the role of finance, and controlled a powerful position in financial speculation.

Yet the main geographical location was not the only criteria with which finance conducted its modality of operations. As the physical trading of goods no more affected the pattern of trading. Therefore, even though this location was primary in informing us of the evolution of financial exchanges, the introduction of automated systems in finance led to a diversity in the options of location in the urban pattern of the city.

The next chapter shall deal with the ideas developed in the financial markets which were a result of the introduction of the electronic communication

[6]http://www.stockmarketinvestinginfo.com/smi_history_add_3.html

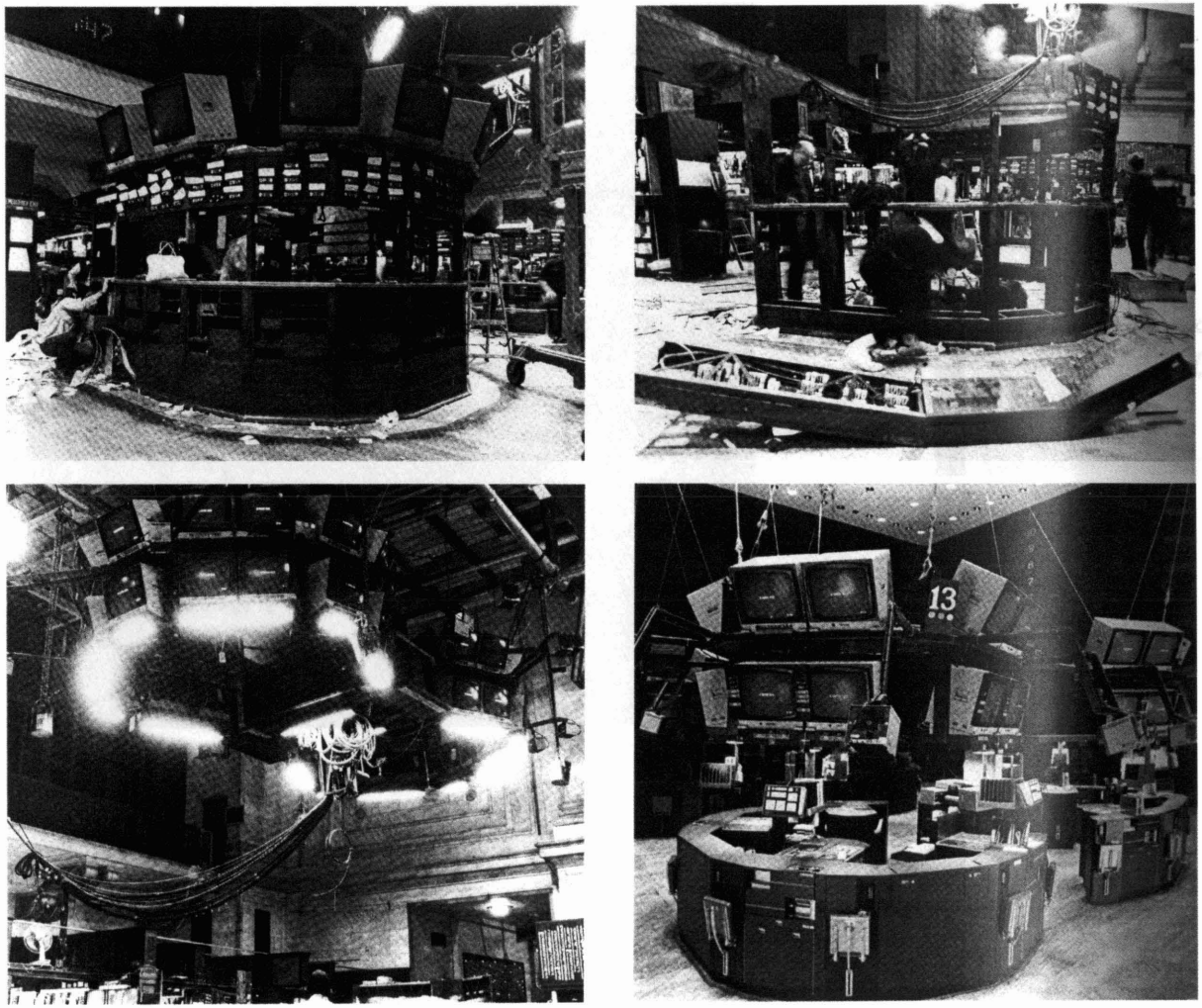


Figure 55: NYSE

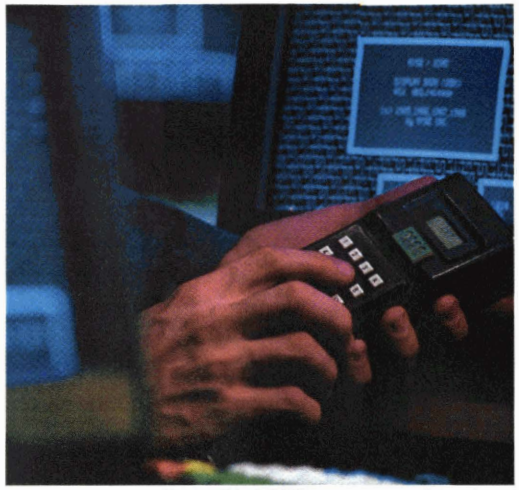


Figure 56: NYSE new systems introduced


Figure 57: NYSE companies listed

Figure 58: NYSE 1990


Figure 59: NYSE 1990

YOUR MONEY AT PLAY

BUSINESS LIFE

CONDO BULL MARKET
This summer you'll be able to live in the House of Morgan - right across from the NYSE.

[Real Estate]

# LIVING IT UP ON WALL STREET

## The world's financial capital is becoming a very pricey bedroom community.

BY OLIVER RYAN

FIRST-TIME VISITORS to Wall Street often stand in front of No. 23, the once-fabled House of Morgan, and stare up at the tall, cramped columns of the New York Stock Exchange across the way, or down the six blocks to the East River, turning over in their minds the vastness of the fortunes made and lost in that short stretch of real estate. There is a giddy satisfaction in putting a face to the name of capitalism.

In the past such visitors would continue on their way, but now they might step right through the doors of No. 23, as though invited by J.P. Morgan. But they're not there as tourists; they're prospective buyers. For the House of Morgan has been officially rebranded Downtown by Philippe Starck, and one-bedrooms start at $1.2 million.

There is a bull market afoot on Wall Street, but this time the brokers aren't named Morgan, Merrill, or Goldman,

Figure 60: An article from Fortune magazine, envisioning a future for Wall street as expensive condominiums (old bank buildings)

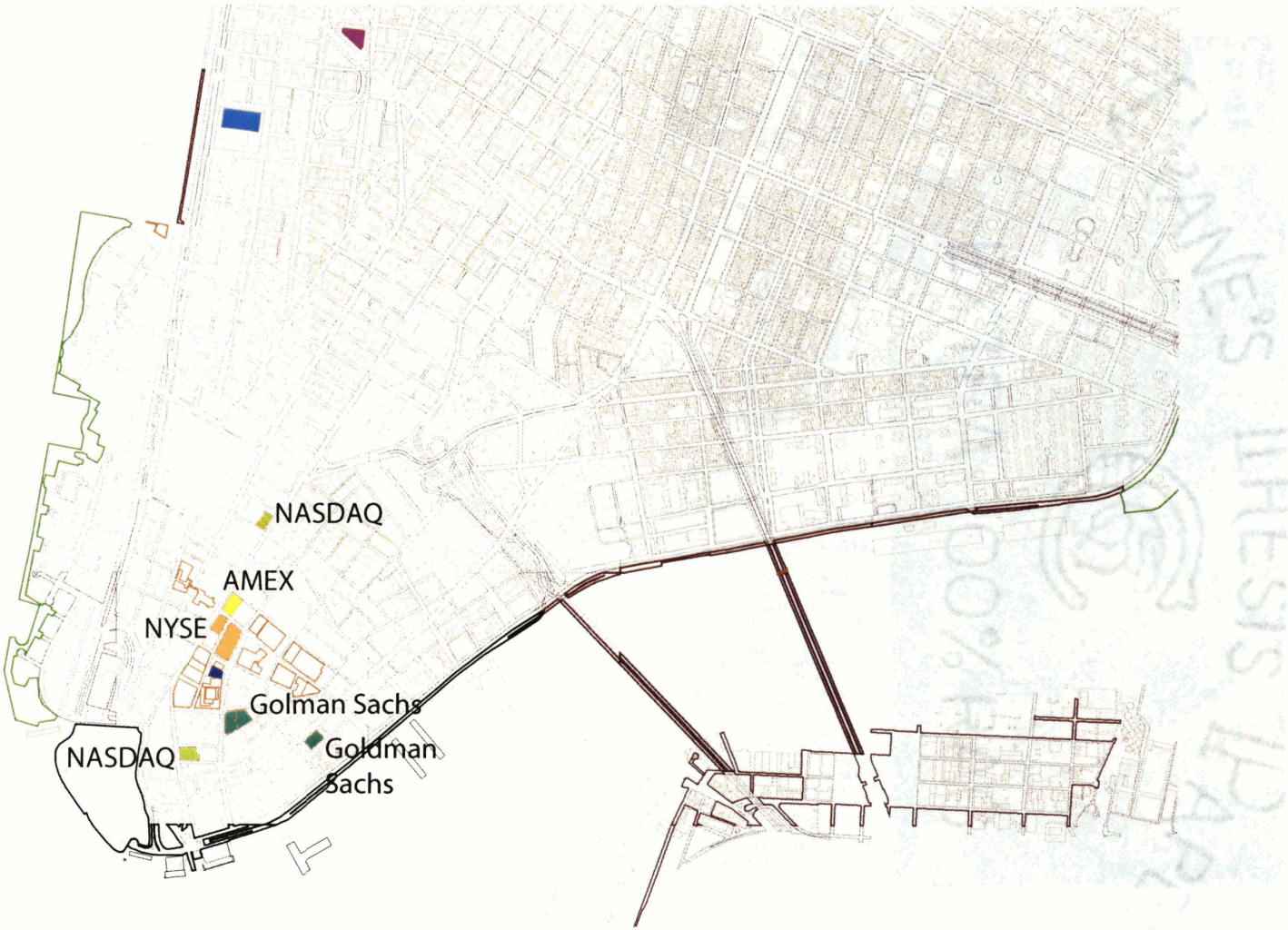



Figure 61: Lower Manhattan region, with the location of the major financial players

Chapter three: Automation of trading markets and their architectural interpretations

## 3.1 The meaning of the network

The idea of business systems have changed with increasing interconnectivity in terms of air travel and communication networks. The networked society has characteristically re-patterned how business systems function and led to a physically distributed spatial configuration. Yet the question looms above us as to how the nature of this network is responsible in the creation of new patterns in cities and if this is actually true or not. The thesis really questions the idea of the network and its ability to be able to structure new patterns in financial services, which can be able to provide us with some answers on how we must be able to design these spaces.

To provide an understanding of a system within the system itself shall not be at a position to really provide ingenious solutions. Therefore it becomes important to understand the transformations in the processes which are being able to create these networks and to look at their precise patterns and ideas. The network is a powerful device to understand and its systems are extremely complex in nature to comprehend initially. Yet it seems to be at the base of all forms of society and is pivotal build a vocabulary of its growth system and how the abstract nature of its applicability can become concrete and inform us.

*New information technologies, by transforming the human processes of information processing, act upon all domains of human activity, and make it possible to establish endless connections between different domains as well as between elements and agents of such activities. A networked, deeply interdependent economy emerges that becomes increasingly able to apply its progress in technology, knowledge, and productivity and efficiency, given the right conditions of equally dramatic organizational and institutional changes*[1]

The network has led to truly diverse ideas being able to connect and cause incomprehensible reconstitution of spaces, business systems, knowledge systems and financial services. In order to form mergers and be able to work together and inform each others aspiration in creating a liquid pool of talent and resource. These possibilities create the base

The dot com era, is at the apex of this pyramid creating a knowledge base system which is able to operate in non-city spaces. Creating a network of communities, and through the network its ability to augment, grow and lead to a state of metamorphosis.

Finally creating "the place" from which many of the biggest software companies rose.
This disconnection from the city, was an embodiment of a new territorial disposition, an ability to re-program the notion of the city and its meaning. Business systems have created a new framework with which they have the need to re-distribute and create a new framework of work structure.

[1] Castells, Manuel. The Rise of the Network Society. Blackwell Publishing.2000.

The thesis shall analyze this aspect of how the network has reconfigured financial services and through this modality it shall inform the changes which the map of physical operations in businesses are changing, creating a new workforce, which will lead to the evolution of a new pattern of the perceived financial district. Mapping the changes occurring in business patterns and their physical distributions in space now. And involve itself in the shifting nature of these patterns, implicitly informing us of how these displaced identities are crucially linked in an inherent self organizing dynamical system. Forseeing these evolutions it shall become clear that city patterns will eventually need to be able accommodate these dynamic patterns within their suspension of current city pattern which have become dogmatic and inherently redundant.

3.2 The Geography of the network

What is the geography of the network and what are its implications on spatial ideas.

*Capra shows how cutting edge research in areas as diverse as cell development, global ecological systems (as represented by the controversial Gaia theory) and by Lovelock's "Daisyworld" simulation model), neuroscience,(as in the work of Gerald Edelman or Oliver Sacks), and studies on the Origins of life based on emerging chemical network theory, are all manifestations of a non linear dynamic perspective. Key new concepts such as attractors, phase portraits, emergent properties, fractals, offering new terms, including social systems- thus paving the way for a theoretical linkage between various fields of science. Not by reducing them to a common set of rules, but by explaining processes and outcomes from the self generating properties of specific living system.*

This set of rule of the operation of the network and its creation has applied modalities and parallels, which can be drawn to this system of operation. Viewing this scale of operation, it can bear an analogy to neural systems in the brain, which work in creating patterns. And these complexities have had many other forms of even more complexities which begin to embody this idea, when the system itself is able to generate by itself. By this I mean that algorithms, now have the possibility of making decisions on previous pattern behaviors and recognizing this field as ever expansive is an extremely simplistic idealized notion.
Yet, it shall be difficult to comprehend the nature of this complexity, as this issue is not central to this thesis.

*Networks traditionally were viewed as static objects...In contrast the scale free model views networked as dynamical systems, incorporating the fact that they are self assembled and evolve in time through the addition and removal of nodes and links. Such a dynamical approach follows the long tradition of physics based modeling, aiming to capture what nature did when it assembled these networks. The expectation behind these modeling efforts is that if we capture the microscopic processes that drive the*


Figure 62: The Mid Town Manhattan region, with the location of the major financial players

*placement of links and nodes, the structural elements and topology will follow from these. In addition, viewing evolving networks as dynamical systems allows us to predict many of their properties analytically.*[2]

The idea of the network and its ability to create a pattern of distribution has changed in physical terms, which inform certain positions and are able to create points of intensity and saturation and points of low energy. This dissipation of points of a system, creates possibilities which seem to us, externally to be innumerable. Yet their positions follow certain geometrical topological formation. Trying to uncover the system of topography of the internet can give us some clues as to how this system operates and how it creates an analogical behavioral pattern to other networks like passenger airline linkage systems or the highway map.

According to this proposition by A. L Barabasi and R. Albert:

*The scale free networks looks more like an airline routing map: most airports are served only by a few carriers, but there are a few hubs, such as Chicago or Frankfurt, from which links emerge to almost all other U.S or European airports, respectively. Thus, just as the smaller airports in the WWW the majority of the documents have only a few links. These few links are not sufficient to ensure that the network is fully connected, a function guaranteed by a few highly connected hubs, that hold the nodes together.*[3]

This idea that there a few central hubs which are highly connected and hold the nodes together, and are characteristically different as systems in terms of knowledge bases and cultural/racial quotients.

But yet the strength of this system is in its high levels of connection which are built and these particular nodes become extremely informed in terms of technological systems and human knowledge resources. And due to the attenuation of a flow of processes, systems, data, trade, these products of urban environment which have been able to reach this epitome of production have the ability/power to gain further significance. The order of differentiation and theoretically their power to connect vehemently to inform each other with the product of the contextualized information seem to augment a hierarchy. Yet we cannot completely simplify a complex array of networks which exist today in the classification of city systems and the economic, political, cultural, racial, knowledge, agricultural, environmental systems which are constantly in a state of flux and these changes seem to have an intricate web of linkages, which are continuously synergistically informing each other to form even more complex



[2]Barabasi, Albert Laszlo. The science of networks- from society to the web.
[3]Barabasi, Albert Laszlo. The science of networks- from society to the web.

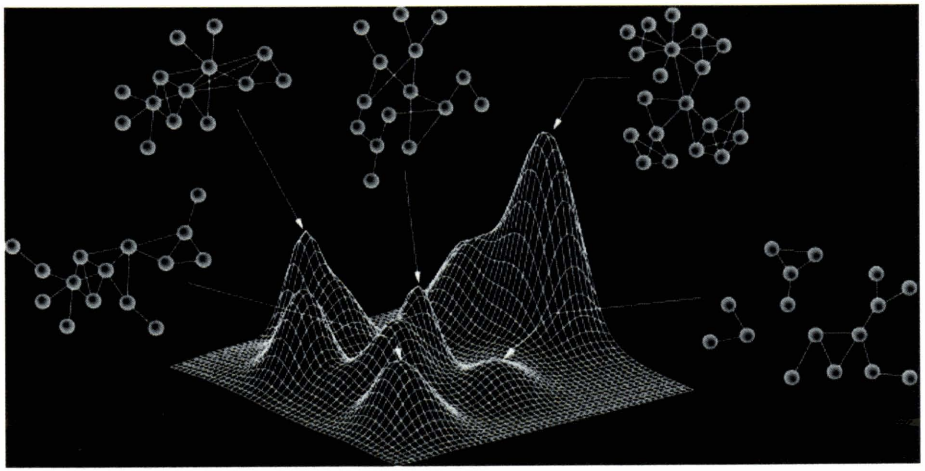


Figure 63: Material structures and networks

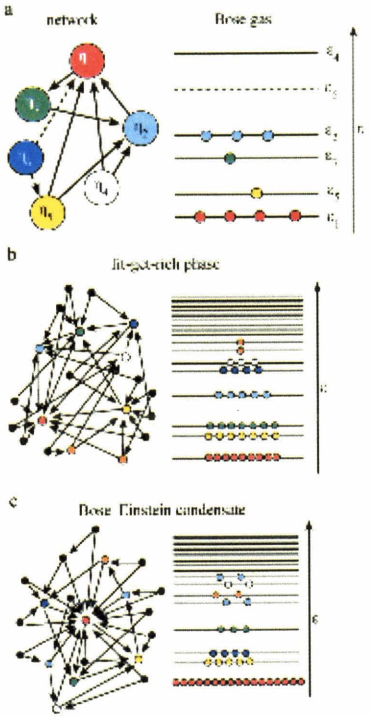



Figure 64: Material structures and network

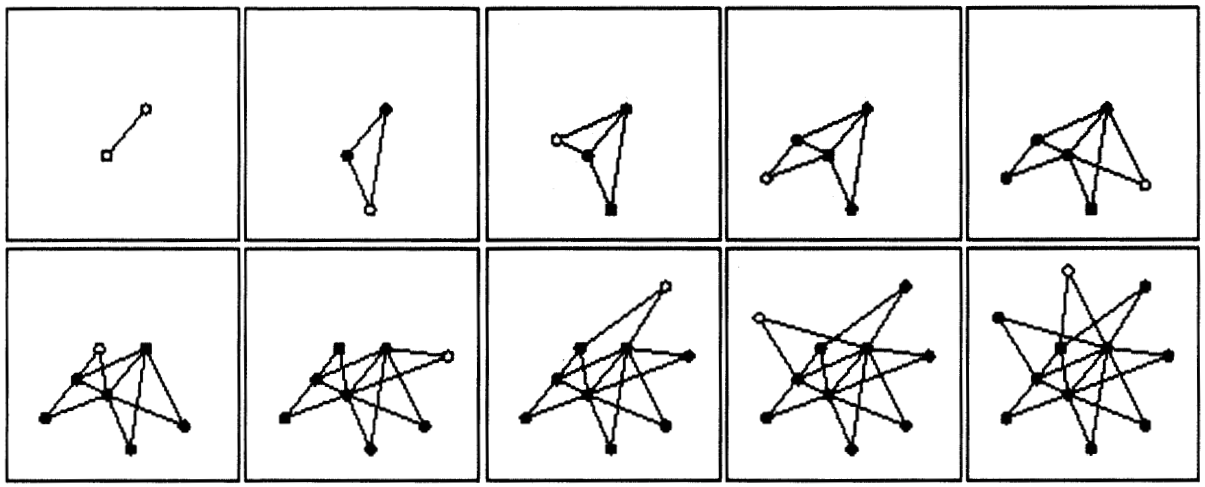


Figure 65: The scale free topology network

patterns. Yet the only difference now, is that through the high speeded network of connectivity and the speed with which these networks can deliver information, the forms of interaction have changed, and our presencing with human relationships is at some level even more informed rather than being disconnected. An this state of constant connectivity, constant mediated presence is characteristic of most teenagers and younger children, who are informed more through their peers than their immediate environments, and have now lost interest in centralized media distribution systems like Televisions, and have more interest in the internet, where they are in control to traverse through environments/games of their choice. This interest in creating a system which works as a highway and is in a constant state of flux, delivering you with the options which are attuned to you, is a new phenomenon. And in its idea and conception it opens many doors to what can be.

*Why do so different systems as the physical network of the internet or the virtual web of the WWW develop similar scale free networks? We have recently traces back the emergence of the power law degree distribution to two common mechanisms absent from classical graph models, but present in many complex networks. First traditional graph theoretic models assumed that the number of nodes in a network is fixed. In contrast the WWW continuously expands by the addition of new web pages, or the Internet grows the installation of new routers and communication links.*[4]

The definition of the Internet, which is now not only associated with informing us, but has become a host of other systems which are "intelligent systems which are linked to each other to constructed to perform operations by being able to be connected":

*The internet is not only constituted by computers connected to other computers: there are also point-of-sale terminals, cameras, robots, telescope, cellular phones, TV set, and an assortment of other hardware components that are connected to the Internet.*

*On October 24, 1995, the U.S Federal Networking Council made the following resolution concerning the definition of the Internet: "Internet', refers to the global information that i) is logically linked together by a globally unique address space based on the Internet protocol or its subsequent extensions/ follow-ons; ii) is able to* support *communication using the Transmission Control Protocol / Internet Protocol (TCP/IP) suite or its subsequent extensions/ follow-ons, and/ or other IP compatible protocols; and iii) provides, uses, or makes accessible, either publicly or privately, high level services layered on the communications and related infrastructure described herein."*[5]

[4]Barabasi, Albert Laszlo. The science of networks- from society to the web.
[5]http://www.itrd.gov/fnc/Internet_res.html

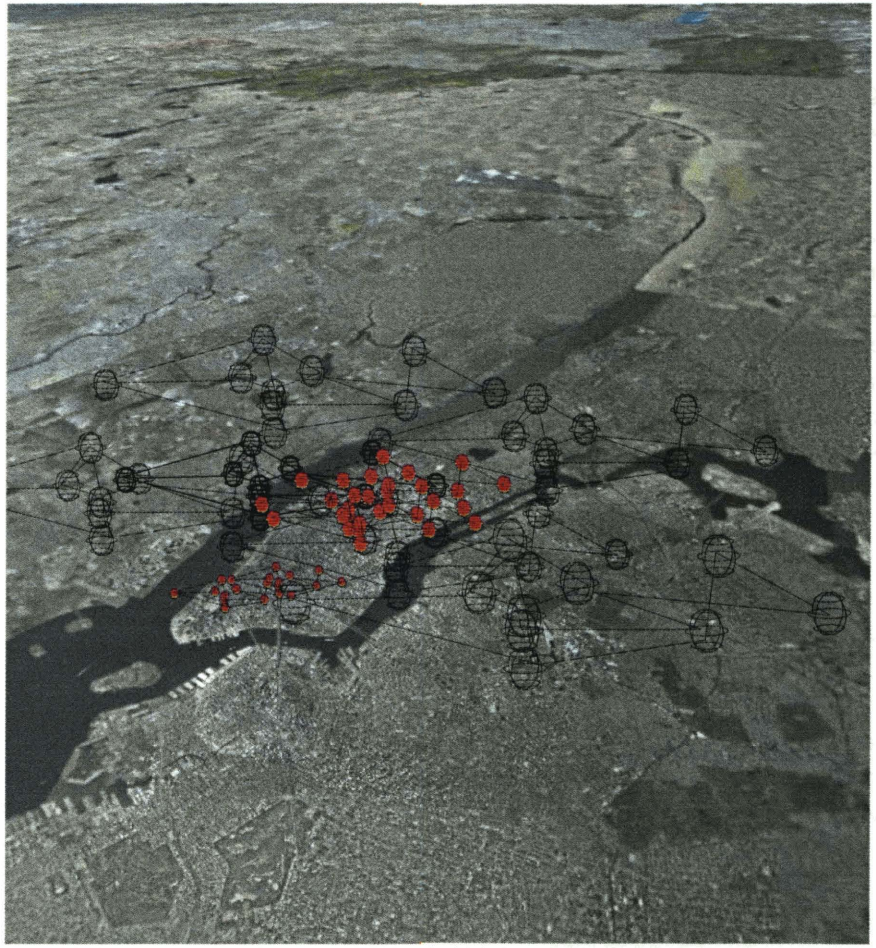


Figure 66: The scale free topology network infused with hubs as systems of distribution

## 3.3 Manual to automated systems

*Things fall apart; the center cannot hold.*[6]

The new modes of electronic trading which create competition to the traditional modes of trading, have eventually led to the elimination of the trading floor, with algorithms taking the place of traders in this aspect of transaction.

*Bank of America corporation said that its move to eliminate 9,000 to 10,000 jobs, or 7% of its workforce, by next summer will save 550 million a year... it will spend $70 million more than planned on electronic commerce systems the rest of the year.*[7]

The shift of storing, disseminating and aggregating information by electronic means has led to the loss of this operational work force. With commercial interests in mind, and optimization of resources, there is a shift to electronic means of processing and disseminating information.

In the process of trading the shift from manual trading to automation was a result of a set of conditions, sinking markets, the fragmentation of markets, decimalization and disintermediation.

Disintermediation is a problem in which the current market conditions which are operating, create the opportunity of direct-access and powerful order management systems (from the buying side) which are able to cause the broker/dealers to feel that they are middle men in the institutional securities markets. Which under the current market conditions can be passed to create more efficiency.

Decimalization was a change introduced in April 2001 which created a shift from quoting stocks in US 0.0625$ to penny increments. This major shift caused a whole new process in the modality of operating stock prices, and was beneficial to investors seeking the best prices, but proved to be a tedious task for firms inside the markets to incorporate these changes. Declining markets and an increase in trade volumes which manually systems could not manage and were in competition with electronic systems, which proved to be more efficient and cost-effective.

Fragmentation of the market is creating extremely complex situations, where electronic systems of trading can benefit to reduce this complexity. For example NASDAQ launched Supermontage in order to centralize the marketplace for Over the Counter Trading issues (OTC). This proved to be somewhat successful, yet it has not taken the market share away from the ECN's. Thus a centralized system of operation is not inevitable.

In the New York Stock Exchange the creation of the Hybrid Market as described below,
was the first attempt to be able to use a hybridization of automated systems with manual inputs.

*Hybrid systems, with both order-driven and quote-driven characteristics are found in New York and Amsterdam. In New York each share is allocated to a specialist. The specialist acts as a broker, executing orders for other brokers on a commission basis. However they may act for their own account (like match makers) by buying from the public*

[6] Yeats W.B. The Second coming.
[7] Wall street journal, July 31, 2000.

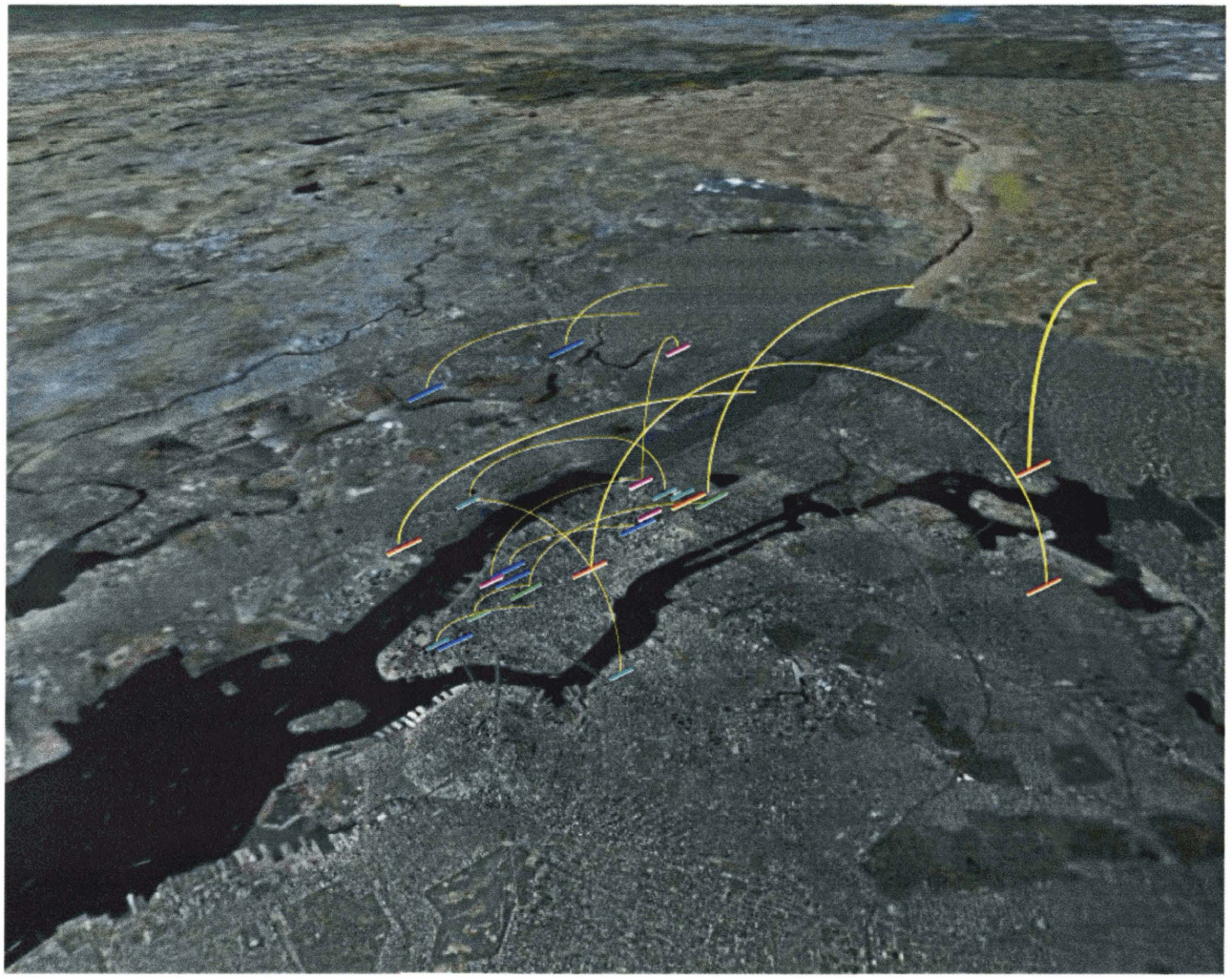


Figure 67: The location of ATI's and ECN's in and around New York


Figure 68: The Market structure now

*when there are no other buyers and selling to the public when they are no other sellers..*[8]

*In the Phase I pilot of the Hybrid Market, several key components were put into production for use by the trading floor. The SEC has approved a limited number of stocks to participate in the pilot. Currently, 132 NYSE stocks have been activated in the pilot, and each week additional stocks are added. All brokers using the NYSE e-Broker℠ hand-held devices and several proprietary firms now have access to these new features:e-Quotes℠, reserves, layering of e-Quotes, cancel and replace functionality and g-Quotes (yielding quotes). Participating vendors and firms include NYFIX, CSFB, Citicorp and Bear Stearns.*
*Specialists have access to the following functionality in this phase: s-Quotes℠, layering of s-Quotes, and c-Quotes. The NYSE Display Book®, an order-management.*[6] *system provided by the NYSE for specialists, has been updated to automatically elect and execute stop orders and CAP orders. In addition, the software now automatically allocates execution reports to DOT® orders, e-Quotes, specialists, and participating crowd traders following the NYSE rules of priority, parity and yielding as outlined in the Hybrid Market rule filings.*[9]

*An important subset of the brokerage industry are companies in the Market structure sector, an eclectic group of trading companies including stock exchanges (NYSE, NASDAQ) derivative exchanges (Chicago Mercantile Exchange, Chicago Board of trade, Chicago Board of options, Eurex , London International Financial futures Exchange), electronic communications networks (ECN's including Instinet, Island, Archipelago, BRUT, Bloomberg, Tradebook), alternative trading systems (ATS's including ITG's,POSIT, Liquidnet, NYFIX, Millenium, Harborside+), NYSE specialists (La Branche, Van der Moolen) and NASDAQ market makers (Knight Trading).*

*E.C.N (Electronic communication networks)*
*Electronic communication networks such as Instinet and Tradebook collect orders from investors, brokers and dealers, and attempt to execute traders from their order books.*
*ECNs have historically provided superior execution services by relying on more innovative technology and more agile customer service. Instinet is the oldest ECN founded in 1969, and was the only ECN trading NASDAQ stocks until 1997.*[10]

The E.C.Ns currently in operation are Instinet, Archipelago, BRUT, Bloomberg, Island, Tradebook. These systems of operation work with the NASDAQ, NYSE in order to inform the markets. And they function as independent systems, and due to the fact that they are electronic in nature they are not bound by location. Though the creation of the E.C.N has had repercussions in the equity which NASDAQ controls. For example, Records from Merril lynch state that " E.C.Ns are accounting for a rising portion of NASDAQ volume and handled an estimated 52% of NASDAQ share volume in the second quarter, down slightly from 53% in the first quarter but up from the previous year's level of 41%. Today the majority of NASDAQ's volume is executed through Instinet, Archipelago and NASDAQ Supermontage. ECNs provide direct access trading to institutions, but are also heavily used by market makers to offload order flow." It is also interesting to note that the mergers which



[8] http://www.nyse.com/marketinfo/hybmarket/1126821290301.html
[9] http://www.nyse.com/marketinfo/hybmarket/1126821290301.html
[10] http://www.celnet.com

occur within the ECNs have created competition for NASDAQ and NYSE.
Which has seen a shifting trend in the way businesses work.
This offers options due to the introduction of new technological innovations in automation, and the re-structuring of the equities market. Creating a knowledge base of ECNs and their architecture which works in another hierarchy to specialize these forms of data creations and data dispersions, which work with the creation of these automated networks, which have the option of location.

Yet their location to a central key location in the city is still a requirement.

As in the case of Instinet corp, Tradebook, Bloomberg and Archipelago, they all seem to be located in centric positions in Mid Town (New York). And yet maintain larger software architectural operations in Brooklyn, New Jersey and Greenwich. Therefore there is multiple nature of their formation. Where the front office, forms an image in the city, being located in an expensive area of town. And demands a sense of pride and business acumen through this pivotal position in the city. And then a secondary location in the suburb, which houses large workforces who would prefer to work out of the suburb (due to better school systems etc) and the nature of an office park environment, which the city cannot provide. Therefore these composite parts of a system which are able to be connected by high speed connectivity (highways and information highways) in physical and virtual terms can operate smoothly.

*Instinet is a professional stock trading system which is owned by Reuters. Institutions use the system to trade large blocks of shares with each other without using the exchanges. Commissions are slightly negotiable but generally $1 per hundred shares. Instinet also runs a crossing network of the NYSE last sale at 6pm. A "cross" is a trade in which a buyer and seller interact directly with no assistance of a market maker or specialist. These buyer-seller pairs are commonly matched up by a computer system such as Instinet.*[11]

*As community standards and trust evolve, human-capital-intensive functions diminish, particularly in instances where they can be partially codified. Codification supports large scale application of previously monopolized human capital and permits redeployment of scarce human capital to new, higher value-added opportunities. And so we observe a cycle within market segments in which intermediaries initially earn large scale returns on human capital but eventually are forced to pursue financial-capital-intensive scale economies. This perspective sheds light on two prominent and seemingly paradoxical, features of the changing landscape in financial markets: the apparent race for scale in the financial markets at large and the simultaneous existence of financial supermarkets and boutiques*[12]

[11] http://invest-faq.com/articles/exch-instinet.html
[12] Downing Joseph D and Wilhelm William Jr. Information Markets: What Business can learn from Financial Innovation. Boston: Harvard Business school Publishing Corporation. 2001

*One of the biggest challenges is in meeting customers' ever-increasing demands for speed. Already, response times from the most time-sensitive customers are measured in double-digit milliseconds, and the clear path is to get to single-digit milliseconds. It's why a handful of customers have located their servers, which hold programmatic trading software, in Archipelago's data center, where the company rents space to organizations that want to shave even the time information loses in transit. It's also one reason Archipelago plans to move one of its matching-engine systems to its New York data center: Some New York customers wanted their servers in-house, but they didn't want to lose even the time - that's 24 milliseconds today - it takes to round-trip a request to Archipelago's Chicago headquarters. The obsession with speed doesn't end with location. All of Archipelago's critical applications are hand-coded to maximize performance. "We pick apart every part of the process to see where we can make it as fast as the physics allow," Rubinow says.*[12]

It begins to become quite clear that the position of the "server", at this point becomes a scalable location which is primarily located according to the fact that it could provide maximized benefits to its providers. Essentially time is of essence, and as suggested by this article

This idea of paradoxically being able to be located in the periphery and the centre, in order to sustain the momentum of operative ness and a corporate image of "being in the city", yet having the ability to locate in New Jersey and Connecticut, which are either able to tap into some kind of human resource which is available at this particular location. It seems to create this point of the thesis that the actual location then becomes very material. And even though the network is very effective in creating connections and even linking systems from anywhere to anywhere, yet the point in question still looms what does this automation in the systems of business mean to urbanism and cities.

This is central to this thesis, yet it cannot have a direct answer to this very crucial question.

We are beguiled by the network at the moment.

The idea of urbanization and the city are extremely paramount as the drive to urbanize shall be creating meta-cities in the next few years. Yet, it becomes important to understand the dynamical patterns with which cities and their edges will begin to create a new notion of how space might begin to inform us how it itself is iterating to create new opportunities supplemented with the infusion of the technologically instantaneous highway which informs it. The virtue of this distributed meaning is still in its very nascent stages of development and cannot be credited with enough data to inform us yet, the attributes and implications of this enhanced new system of occupied territories which work with the potentials of the network to cause a new distribution system of enhanced points of civilization and urban system are possible.



[12]http://www.wallstreetandtech.com/showArticle.jhtml?articleID=51000190

The reality with which cities have been processed in this case is untrue. They live in another reality, within different encapsulated environments and serve the progress of aero-programmable systems which are dispersed with ideas embedded in the air. For example the shift of approximately 380 hedge fund company's to Greenwich (in Connecticut). This boomtown as is described by Stephen Scurs article in " A day in the life of America's financial frontier boom town", is home to this new influx of entrepreneurs who have a penchant for extremely luxurious living, which can be witnessed in the transformation of this town. Due to this influx it has seen a major "tear down mania" and the building of large excessive termed as "gated homes". The Public library now contains a terminal the Bloomberg interface. This exclusivity of customizing a set of spaces in order to create a new layer with which to inhabit this space with a new form of gentrification and knowledge powered service and identity through "a few" is characteristically new. Also the creation of wealth which is not based principally on any attributes to the location of the place, yet it seems to become a nodal location for these hedge fund company's. One of the advantageous positions which become necessary to conduct business of this nature is the close proximity of the city of New York. Therefore the idea of being able to physically link to the city by an hours commute for a certain type of workforce which may live in the city, is still possible.
This location of the periphery, is able to attract both the city dwellers who are willing to or who have to make this trip. And the suburban dweller who owns a palatial residence and wants to live in the suburb and work in this type of establishment, and live this secured lifestyle, which cannot be found in the city. The option which is open to both, has been possible through the networked connections which make this ideal ground possible. And yet the antithesis to this idea can postulate that these random locations which establish themselves for these found businesses can be anywhere.

So, the randomness of decision of place may actually not be a random choice, this can be argued. As the choice of place may be dependent on weather patterns, the level of destructive powers of earthquakes/hurricanes/floods, the human resource knowledge base, the current transportation network and connectivity and such potential crucial questions which become important for these edge cities to be able to gain importance as secondary players to cities.

And imprint this town with the specifications which are required by the townspeople in order to conduct theoretically "one form of business". This exclusivity in the social hierarchy of "very rich" people and inclusion of spaces which only accommodate and cater their needs, seem to be the idealized environments which they are looking for, and cannot create in the city. This idea of location, which is only been able to process through the operation of networks which can connect these places

Understanding the architecture of network structure's follows a difficult and incomprehensible situation. Yet one can try and comprehend that the

networks which work in a specified field of organization usually are

*Financial markets are markets, but so imperfect that they only partly respond to the laws of demand and supply . Movements in financial markets are the result of a complex combination of market rules, business strategies, politically motivated policies, central banks' machinations, technocrat's ideology, crowd psychology, speculative maneuvering and information turbulences of various origins.*[13]

World cities and their determinism to be capitals of capitalism

What makes a world city?
The term world city coined by Patrick Geddes in 1915 and he defined them as places where the world's business was done. This seems to be a very simplistic notion. Yet it emphasizes quite eloquently the basic nature of these places and their ability and infrastructural advantage to be able to handle the business of the world.

The propensity to be able to constitute this system in itself which has been created as a measure of the notions of the powers of production, the rates of exchange which begin to be the modality of operation, the volatility of these actions which are able to propagate and create points of intense agglomeration of wealth (through the option of reaching this level)

It almost seems that a combinatory process of production services, the location of stock markets which are able to offer these services and a cultural amalgamation of human resources which are not achievable by normal cities are embodied in world cities.
A combination of being a centre for financial services and cultural innovation, both which would need to complement each other. Therefore it is quite common for the fashion capitals to also be associated with world cities like Tokyo, London and New York.

This dual system of finance and arts which come together in extremely intense urbanized centers project the ideas which



[13]Catells , Manuel. The Rise of The Network Society. (106)

are associated with a World city.

The ideas of capitalism and their propagation led to the evolution of a certain type of city which needed certain typical kinds of sources which needed to make it so.

*Determinants of the competitiveness of a financial center*

*The ideas of Noyelle:*
*Agglomeration of Demand*
*Agglomeration of supply*
*Agglomeration of financial intermediaries*
*Environment of innovation*
*Technological environment*
*Availability and cost of labor*
*Other operating costs*
*Agglomeration of support business services*

*Financial Times*
*Well run disciplined markets*
*Multi currency dealings*
*Pool of world class talent*
*A centralized banking system*
*Avoidance of over regulation*
*Lee and Schmidt Marwede (1993)*
*Enabling infrastructure*
*Built environment of commerce*
*Size of financial centers*
*Production of financial centers*

*Thrift (1949)*
*Business organizations- sociability and proximity*
*Markets- large size, rapid dissemination* of information and quick response
Culture – information, expertise and contacts[14]

*The bourgeoisie cannot exist without constantly revolutionizing the instruments of production, and thereby the relations of production, and with them the whole relations of society…Constant revolutionizing of production, uninterrupted disturbance of all social relations, everlasting uncertainty and agitation, distinguish the bourgeoisie epoch from all earlier ones. All fixed, fast frozen relations, with their train of ancient and venerable prejudices and opinions are swept away, all new-formed ones become antiquated before they can ossify. All that is sold melts into air all that is holy is profaned.*[15]

The characterization of a world city comes into question here. Where complex systems which require a systematized human intervention and are characterized by higher levels of knowledge services are coagulated in these principal centers which are able to create this human system of Cohesion and is able to bring this kind of spirit (of the city) in terms of a heightened level of services. The services which are required to assist them in their process of work creates platforms which are bound to a system of networked connections which form a close cohesion of operation. In terms of informing and developing relationships of communication. This level of intensity is only possible by being located in the city/

*The territorial dispersal of factories, especially of international actually raises the demand for producer services. This is yet another meaning of globalization: headquartered in New York or London or Paris can be fed by manufacturing located anywhere in the world as long as there is part of a multinational corporate network. The new urban core was fed by the deregulation of various economic sectors, the ascendance of finance and specialized services, and integration into the world markets. The opening of stock markets to foreign investors and the privatization of what were once public sector firms have been crucial institutional arenas for this articulation.*[16]

[14] *Short Rennie, John and Yeong-Hyun, Kim. Globalization and the City. New York: Addison Wesley Longman Limited. 1999.*
[15] *(Marx and Engels, first published 1872, 1968)*
[16] *Short. Globalization and the City.*

| | CH | FF | HK | LN | LA | ML | NY | PA | SG | TK |
|---|---|---|---|---|---|---|---|---|---|---|
| Chicago | | | | | | | | | | |
| Frankfurt | 21 | | | | | | | | | |
| Hong Kong | 21 | 30 | | | | | | | | |
| London | 23 | 32 | 38 | | | | | | | |
| Los-Angeles | 21 | 23 | 29 | 33 | | | | | | |
| Milan | 19 | 28 | 29 | 32 | 22 | | | | | |
| New York | 23 | 32 | 38 | 45 | 32 | 32 | | | | |
| Paris | 21 | 30 | 32 | 35 | 27 | 28 | 34 | | | |
| Singapore | 20 | 30 | 34 | 35 | 26 | 29 | 35 | 32 | | |
| Tokyo | 23 | 30 | 34 | 37 | 30 | 29 | 37 | 32 | 32 | |

Relation between Alpha World cities: Shared firm presence, number of firms with offices in both cities.[17]

The nature of these cities are almost inclined to certain populations of where this idea which is able to hold and power these complex systems and networks, yet needs an identity of place. As the centers of corporate headquarters, international finance and high level business services and communication systems are still centered in the city.
And even though the network and automation extends the possibility with which there is a dissemination of services and platforms which are located in the periphery or in other countries which are able to provide these services. Yet there is a level of hierarchy which defines accessibility and a defining homogeneity which identifies the role of the city and its centrality to the process. The issues which are crucial to establish are the fact that the creation of networks ease the flow of communication and the potentially the importance of the location which becomes a nodal centre for a certain form of operation

The creation of a system of connection which works at different levels in order to address the medium of operation and interest at hand, creates a distribution system of signs, symbols and expressions which are freely floating in a complex array of meanings.

As most functions can be performed using automation, then the distribution of people, creates options of being in the city, out of the city (on the edge) or located in complete isolation. This hierarchy is determined by gradation of income and opportunity of work. As extremely rich people can locate themselves almost anywhere. The professionals, entrepreneurs are located in the centre or the hub of the city. And the working class

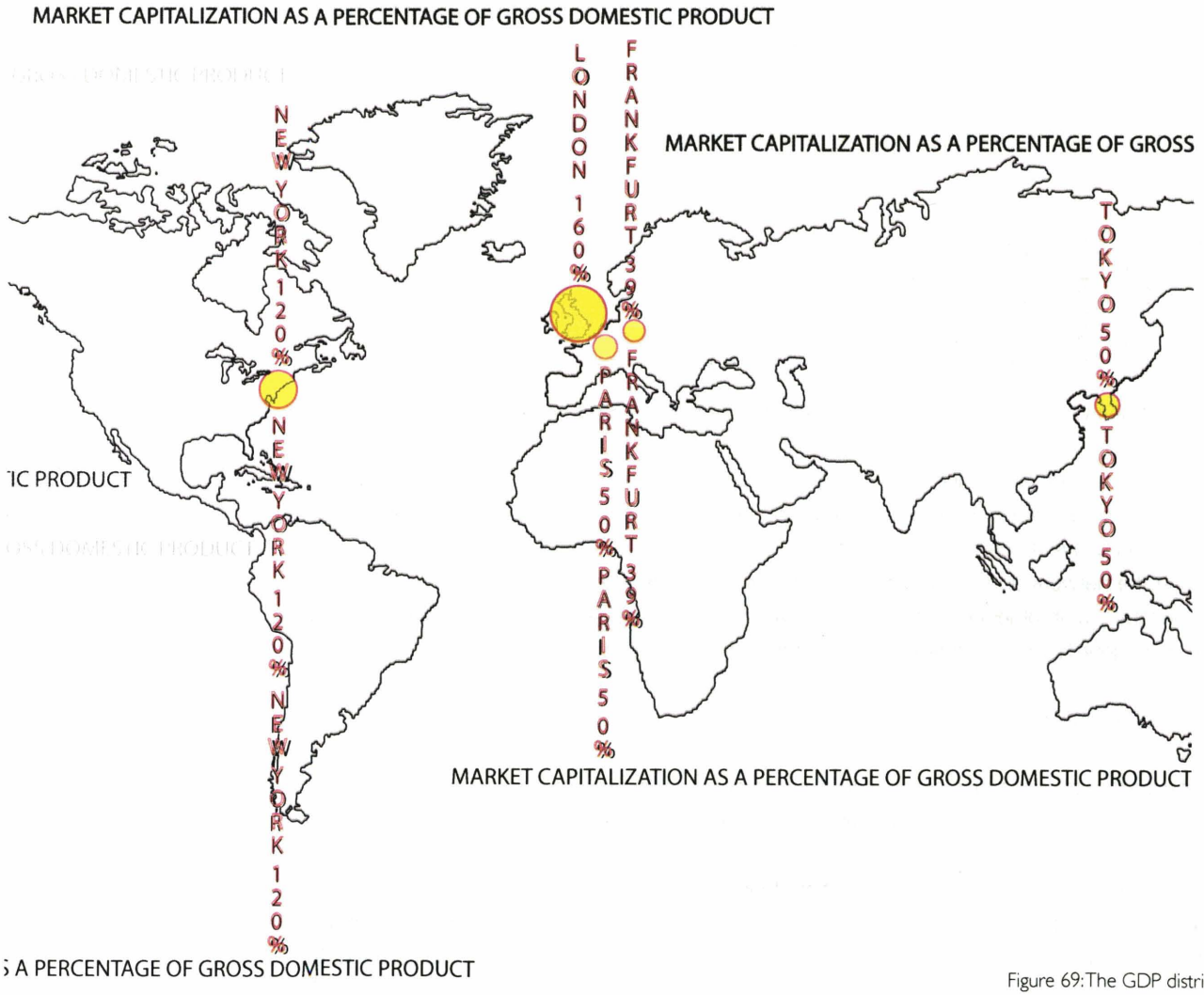



Figure 69: The GDP distribution

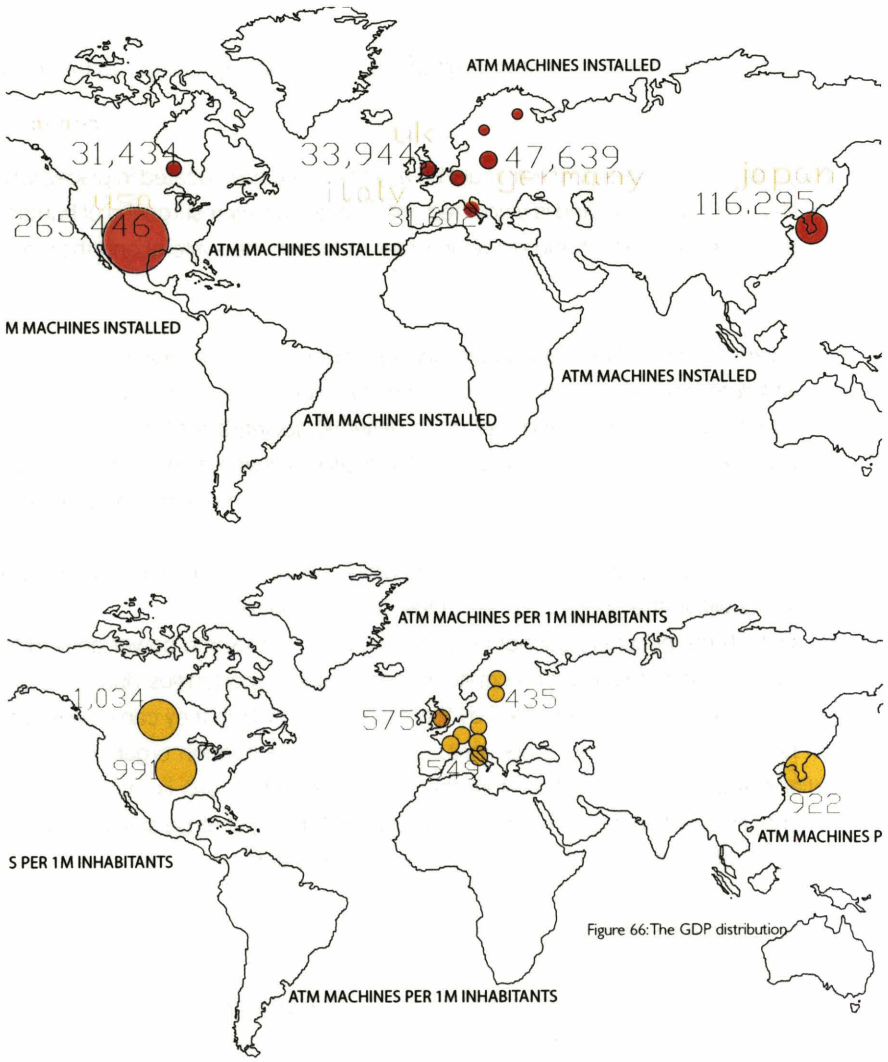



Figure 66: The GDP distribution

Figure 70: The ATM Distribution

who don't have a choice have to service the needs of the rich, are also located in ghettoes, within the city in order to be able to fulfill economic equations of desperate need.

The dispersion of communities which are performing tasks of operations which could be anywhere are now located in places which are anywhere. And the constancy of location of here, which permeates the city space, and is a coveted one, creates a new resurgence of human capital resources which have been now reduced to a selected few (who have the intellect and power in order to furnish the system) and their location in the dense construct of the city.

*Robustness is of major concern for biologists, who want to understand how a cell survives under extreme conditions and frequent errors. Most systems displaying a high degree of tolerance against failures share a common feature. Their functionality is guaranteed by a highly interconnected complex network. A cell's robustness is hidden in its intricate regulatory and metabolic network; society's resilience is rooted in the interwoven social web; the economy's stability is maintained by a delicate network of financial and regulatory organizations. It seems that nature strives to achieve robustness through interconnectivity. Such universal choice of a network architecture is perhaps more than a coincidence.*[18]

And the interconnection of networks which are wired through personal and connections of professional interests which weave a compelling pattern of stories and ideas of the city. This possibility only exists within the dense confines of the inner city pattern.
The Modern metropolis holds key to such solutions which the periphery cannot begin to weave. This extreme power derived from the density of city and its infinite possibilities similar to the tendencies of the network which create immeasurable opportunities due to its intensity and potent connectivities. The answer to successful financial districts seem to be determined by the intensity with which they can create options for maximum interconnectivity. And the essence of an incomprehensible level of interconnections, is only possible through organic processes, as inorganic/ Cartesian systems have a predictable map of options and connections. Therefore the conclusion to this idea is that an amorphous nature of a system which may be able to form many hidden connections within the perceivable map of connections, shall be able to create a dynamic system of options and be able to be fluid in nature. The essence of which is comprehensible in biological systems.

The shift in the pattern of finance – in the order of spreading the system.

The shift in the pattern of relocation took place in the early 20's 30's when there was a structural change of finance with the creation of capital which was made by a few, who capitalized on the benefits of the railroad and were able to create their own financial corporations. For example Morgan



[18]Barabasi Albert Laszlo. Linked The New Science of Networks. Cambridge: Perseus Publishing. 2002. (pg 111)

Chapter four: What is the character of the market now

The impact of the internet on business has had many structural changes and caused the pattern of businesses to change. The order of the day are in fact "mergers" and acquisitions. The ability to adapt to this vast networked society or not has not been a choice but a necessity for most business patterns and market structures.

New composites and the creation of media/entertainment into the agglomeration of services in order to enable each others interests. Have led to maximizing the productivity and enhance the possibilities of permeating new markets through these processes of technical improvements and constant changes which every system needs to incorporate in order to "be a part of the system".

*The use of electronic trading is providing new distribution channels and shifting the balance of power to the consumer. For the user, the effect will be a cheaper and more efficient service. For the supplier, it will bring new sales and distribution channel, but also exposure to new competition. The effects will be felt in all our financial markets-banking, bonds, equities, foreign exchange, derivatives and insurance.*[1]

Comparison of Market structures (before the internet)

Market structures before the Internet were extremely structured and hierarchical. With industrialization at its peak, the nature of operation was that of locating most industrial processes in the centre of the city and creating a very efficient system of grids, which was able to create the flow of these operations in a systematic nature. The nineteenth century was based on this idea. Circulation systems formed grand patterns in cities. A similar analogy can be applied to market systems at this moment as the circulation of money began to be encouraged. And this whole notion seems to be informed by the discovery in medicine, which implied that the health of the body was determined by continuous flow of blood which needed to simultaneously replenish all the organs and systems of functioning.

Adam Smith in his idea of economic theory saw this parallel (in the advent of the discovery of the circulatory systems of blood) in the flow of money which should be in a perpetual state of flow to be able to generate more money.

This lends itself to an abstract principle which seems to be crucial in this process.

The abstract principle is the notions understood in science (of the discoveries in medicine at that point in history), finance and city design were inter-related and intrinsic to each others growth. The principle idea at this moment was that a static system which had mechanized ordered abilities shall be able to solve mechanisms of the city.

Financial districts which were planned in most cities during this time were extremely structured spaces, promoting high density, located in

[1] http://www.celnet.com

exclusive downtowns, almost acting as nucleii /hearts/the engines of the city.
And worked with a distribution pattern (transportation) which was highly structured, carefully linking with transportation and train systems. Yet at this moment the business structure in itself had not been able to move to the suburb or any other distant location as this was before the internet was created.

The dispersed city- the idea of the non city
By reference to the dispersed city I am not referring to the idea of the creation of the Suburb and this proclamation that the prospect of the edge of the city which began due to the highway system, but the idea of the dispersion of a system. Which does not correspond to the previous grid systems but creates a new one.

Non hierarchy in city patterns

Edges – Nodes – Hubs- New Patterned environments- Dot com era- dispersed identity- new formulations comparison to the nineteenth century city – contrasting these two ideas notions of pattern and power. How the port/point of entry and exit was important in the creation of a political and powerful accessibility and how this notion of space has been now dispersed. As modes of commerce are now extremely diversified in their nature. This complexity and an addition of information architecture to the process of creating informing portals to the mechanism of the stock exchange have now created new potentials of growth in distribution of new forms.
At this moment it becomes important to understand the nature of business, the trends in the inorganic nature of their pattern. And through their distribution system, we can form a synthesis of systems which shall be able to accommodate new designs and ideas with which the new financial dispersed and concentrated systems can work in a design.

*A scale-free network is a specific kind of* **complex network** *that has attracted attention since many real-world networks fall into this category. In scale-free networks, some nodes act as "highly connected hubs" (high* **degree***), although most nodes are of low degree.*[2]

The creation of the market
The idea of the market from which dependencies are formed on the structure of others, this interelatedness and the causation of intermingling through this process of synthesis, in which symbiotic relationships are formed through the processing of the network. The network is then key in the culmination of these ideas to comprehend to come together. In the meticulous synthesis of these options
The market structure which is being created and enacted at the present moment, has been through the process of evolution through the ages, and mostly during the years of the industrial revolution and the creation of money systems (the birth of foreign

[2]Barabasi Albert Laszlo. Linked The New Science of Networks. Cambridge: Perseus Publishing. 2002

exchange as a mode of trading). This evolving phase of finance which can almost create a systematization.

This creation of aspiration in the terms of coming into the phases of industrialization which was able to steer a powerful mechanism with were establishing and embellishing the colonial empires and were fully embodied in the creation of profit in these establishments.

Now it is important to understand, that with the introduction of technologically innovated systems like the World wide web and ECN's, the world as we know it has transformed ionizing the rationale with which this structure was built in physical (terms of space for banks etc) and in terms of the modality of functioning. The prospect of these new structured spaces which are able to inform "set positions of operating" into a fluid open ground with which new formations in spatial re-structuring is inevitably taking place.

Network – Centre - Periphery

The system of the market and its structural changes which have created a new pattern of work. This creation of work pattern has then eventually led to the re-distribution pattern of a set of functions which then cam be performed at different places ,therefore this informs us that there is a set of systems which had established itself with the birth of stock market and exchanges which needed to be established based on a system of distribution- which was effectively a structural one and was informed on the role of Bank teller to auto mated teller- dispersion of system of place-the connection of new places- the automation of place in the creation of a new automated space structure, with the possibility of indefinite connections.

The identity of place in this context has begun to change and with it specific attachments and associations which then begin to become associated within this mediated space also change. And an incessant to create a universal identity has been ubiquitous. Yet, this concept of the brand, its image is one that is old and has now been

The space in itself becomes one which experience has changed it and its attachments to differentiated ideas become possible. The creation of an unspoken language which becomes to be able to carry messages and ideas through this mediated system of porosity. With points of entry and access which are decided by the avenues and locations of financial stimulation. The city then begins to take shape in a different context with the accumulation of wealth in certain locations and the not in another. It almost seems that there is a diversion in interests from the idea with which there was a structured financial zone or district, there seems to be a new modality of operation which subserviates and creates undercurrents which pull the main functions with which finance functions and pulls it away to "other locations" which are able to concur together to create a new meta-level of communications and are fed by the system of the network

Where is the Bank? Nowhere/Everywhere/no particular place/

We have discussed the idea of the network in the previous chapter.

But, the idea with which the financial institution has been dispersed or fragmented with the agglomeration of the network, has not really been discussed. It comes to be that the financial services which are now available, in the banking sector, have seen an extreme sense of dissipation, ever since the creation of the ATM ( Automated teller machine), which acts/replaced the idea of a bank. This shift, created a new ground of operation with which banks and their buildings have now been reduced in numbers.

And the Retail Bank which is in discussion here, is able to operate from many locations. This new dispersed identity has not changed the need of bank branches, as a face to face contact is required for complex issues to be resolved, and the branch presencing is required for certain banks to be able to attract customers. So their presence in crucial locations becomes a market driven requirement, almost seeing their placement as a billboard/advertisement, establishing the fact that they are present.

The location of ATM's and their presence in the form of these maps. The importance of this mechanism of the ATM, being located near most shopping malls/places of retail/commercial main streets/ other places of retail.

The idea of distribution of money has now become an agglomerate of consumption and the constant need to disperse paper money. Automation has made this process more dispensable. Making it possible to travel across borders, and access any system of exchange (by this very intervention of the network), to get money.

This ability to truly transgress political borders with the credit card. Has led to an understanding of a new pattern with which the network is evocating a new way of understanding the monetary system of flows which operate in unique virtual networks and have highly specialized information architecture.

The net-work and computational potential has posed - a new force field with which we must imagine is now going to be able to change the way we see, act, conduct business, live, work, play and amass information in making the new centers for cities.

As the creation of this force field as in any dynamical system, has caused new workforces to emerge, new technical knowledge bases and the evolution of new forms of spaces and environments which are becoming absolute in cities. This thesis is in a position to make a commentary about the systems in finance, through the seventeenth to the twentieth centuries, of how finance, caused major structural changes in cities. And in this case empowered a few to be able to become capitals of the world and control financial systems in worldwide markets. This ability has been reinforced with the new inventions in technology and the modality of their operation to create hugely centralized formulations of power and energy to a few locations. This process of the creation of world city has been discussed in the previous chapters. And in its final stages of evolvement , at least in the case of cities like New York, their creation (in the past 200 years) had arisen due to the migration of a heterogenous work force to a new country and their endeavor to create their "own identity" and strive to independent grounds, and the final creation of one of the most coveted streets of financial power

which was able to compete with the riches of the British Empire and eventually become, even more powerful, after it began to use mechanical means (the introduction of the stock ticker/the discovery of the telephone by Alexander graham Bell and the first trans-atlantic cable) to increase their productivity and continuously expand their systems to incorporate this idea. This idea of the fusion of technology in the market was responsible in the creation of market mechanisms which inherently began to be able to get incredibly complex, with the introduction of futures trading and derivates which began to be able be a part of the system, with the introduction of complex algorithms which were able to compute data at extremely small intervals of time (not possible by humans) and able to create systems of distribution which were able to inform a set of people at instantaneous moments. The ideas (the dot com boom) of the creation of the se platforms in themselves were able to enhance the systems and the stock options as well.

It becomes paramount to understand the levels of operation of physics, the financial systems of operation, to inform us of the new urban systems which would create work systems. The universal ideas of the moment, in scientific knowledge, cultural ethos are usually at the epicenter of the ideas which inform us of the way in which these fields must coagulate (the sciences and the arts) in order to inform us of how the future can be patterned. The ideas in physics, were paramount in understanding how the world was perceived, the ideas of "how the perspective" , was developed for example changed architecture.

*Strange attractors: In* dynamical systems, *an* attractor *is a set to which the system evolves after a long enough time. For the set to be an attractor, trajectories that get close enough to the attractor must remain close even if slightly disturbed. Geometrically, an attractor can be a point, a curve, a* manifold, *or even a complicated set with fractal structures known as a strange attractor. Describing the attractors of chaotic dynamical systems has been one of the achievements of* chaos theory. *A trajectory of the dynamical system in the attractor does not have to satisfy any special constraints except for remaining on the attractor. The trajectory may be periodic or chaotic or of any other type.*[2]

[1] Barabasi, A. L and Stanley, H. E. Fractal concepts in surface growth. New York: Cambridge University Press. 1995

Chapter five: Final comments

The changes in the Eastern perception of finance and the western systems have now amalgamated into a porous matter of connectivity and speeded systematized processes.

The root of all operations which inform us how to perceive, have changed in their temporality. To put it very simply the creation of these high speeded connections, have created a time-warp as data is now processed instantaneously. The question then arises as to what would be the notions of scale and shape of urban form and building with these new introductions of catalysts in data transfer processes.

To understand the state of time in physics, at the moment the study of the morphology of surfaces have led to the ideas with which we can be informed with the an introduction to the idea of time, with respect to the *length scale of the observation.*

As is described here by the physicist Barabasi,

*We become accustomed to the shapes of the interfaces we encounter, so it can be surprising that their morphologies can appear to be quite different depending in the time scale with which we observe them. For example, an astronaut in space sees Earth as a smooth ball. However Earth appears to be anything but smooth when climbing a mountain, as we encounter a seemingly endless hierarchy of ups and downs along our way.*
*We can already draw one conclusion: surfaces can be smooth, such as the Himalayas viewed from space, but the same surface can also be rough, such as the same mountains viewed from Earth. In general the morphology depends on the length scale of observation.*[1]

Financial systems have now been able to gain complexity with the introduction of computation and the use of algorithms which can calculate probability (trading in future options and derivatives) which have begun to cause a volatility which is comparable to natural non-linear systems which do not have deterministic ideation, but are based on parallel knowledge systems.

This creation of an analogical proclamation between weather patterns and financial flows is not a unique thesis. As theories in fluid mechanic systems and market mechanisms form parallel universal laws which develop pattern with mathematics as the base (as nuclear scientists and mathematics majors usually do become market analysts). Theories in the discourse of science are merging with the complexities which are able to inform other disciplines, as the basis of these ideas are in the language of mathematics and computation. Through the interweaving of these platforms, there is a new synergy in perceiving the notion of space and attributing new meanings which become applicable. The creation of new techniques of information platforms which are able to generate accurate satellite images of cities and geographical data. Are able to provide a pervasive image of the urban pattern, informing us of all the current complexities in terms of population, wireless usage etc. And the Internet is able to inform us, through marketing techniques and an extreme sense of feedback, how people live, work, play

and exactly which times are associated with the usage of particular kinds of spaces. This availability of information has been made possible by actually tracking the rituals of people and working with psychology to inform business ventures.

*There are too many questions, there is not one solution.*[2]

There can be no one answer to the complexity with which meanings, associations and interests are profusely created and destroyed in a high speed format.

High speeded networks have led to mergers and acquisitions which are a new phenomenon. These coagulations are not intermediary in compositing the basis of operations in business dealings. Forming a blurring line between functional notions of business, when there are shared momentary interests and their mergers can assist in making these options. The acquisition of a corporation, its merger and the idea of a "syndicate loan" where banks across countries work together sharing moneyed interests in order to furnish a loan, are all new formations in the business world.

And this incredible hive of options, choices and credit flow has only been possible after the electronic communication network was able to inform these options and compute the data.
Making endless possibilities and creating many questions and confusions.

The answers of how to design these new financial frontiers (or new capitals yet to be established with financial districts or non-districts in them) shall not be an easy task.

As the old data, which informed us of how market structures worked before the computer and the ECN was established, is the modality with which we are informed of how these systems operate (at the moment).

That is why this thesis has created a point of speculation of how business structures are now re-structured, and what its implications on the design of these cities and spaces would be for future systems.

So the issues which are pivotal at the moment, are those which need to understand how the nature of business has transformed and design must inform these systems, to be able to make them committal to flexibility, yet hold a static die.

Dualism and concurrent activities, working in encapsulated separations, connected through wireless systems and the notions of being able to be located anywhere, now has become an option.

But the birth of the network, has created smaller nodes, which work as knowledge centers and high tech powerhouses (silicon valley and Bangalore). These new services which are attached to signifying a meaning to a particular place also have some associative breeding lifestyle and personality (as they create similar professional interests to concentrate).

[2] Madonna. Love Profusion.(First line of the song)

The skill which is required in this non-city is usually a knowledge based system, with an understanding of new language systems which are based on information and knowledge development. This also creates a new discipline of a stylized city for "one or two kinds of work patterns and professional service". Concentrations of like minded services, which are almost communal in terms of societal and professional needs. Corresponding to this notion there is a highly personified agglomeration of interests, which are satisfied at this dispersed location. The option of place is created through the means of connectivity to the city, yet not being central in the city.

This idea of identification of place with a specialized workforce is new and has been extremely crucial from the mid 1960's (Palo Alto, California) to now, in creating a sensitized place with a meaningful fulfillment of innovations and desire (Hollywood). Both systems (entertainment and software) which complement each other and are required in order to produce films etc.

Therefore their place allocation and systems need an image of "the city", in this case Hollywood, connected to the grid of Los Angeles.

And in the broader context, Palo Alto (is in California as well), but not necessarily Los Angeles in this case.

Yet their notions of space are differentiated.
And signify a clearly different meaning based on the pure ideas with which they are associated with "an industry of software" or "an industry of film making". Distinction in the persona of the city is obviously an outcome of the people and their renditions.

Thus the operation of a cohesive duality with which we can comprehend the complex nature of the city with the network emerges. And an undercurrent of mechanisms are regenerated, forming new iterations of flexible options (non-city, edge city, suburbia). Therefore the network almost seems to act as a catalyst in this creative process of creating new modalities of cities, which like Lego pieces can be put together in a million different ways.

The technological paradigm always informs us and its applicability is usually felt after a period of 5-10 years after its introduction in society. And it seems that computation and its true abilities are only in a very nascent stage of experimentation, where the shift in the language base from mathematics to software languages (of which the base is still mathematics) will only lead to the genesis of ideas in a few years from now.

Yet it becomes an interesting point to inform us that the evolution of distribution systems and the eventual creation of a new map of significant urban cities in the next millennium will be based on a multitude of operations, in science, technology, business structures, medicine, social sciences, film, music and biotechnology. This true amalgamation of and cross fertilization of ideas shall be responsible in formulating a new pattern for the financial district and eventually re-structure new patterns of growth in cities.

**IMAGE CREDITS**

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